

# The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XVIII: No. 12.

New York, Thursday, September 21, 1876.

\$4.50 a Year, Including Postage.  
Single Copies, Ten Cents.

## The "Waters Governor."

The accompanying cut shows a perspective elevation of the "Waters governor," which in several essential points overcomes difficulties heretofore existing in governors. The principal features of improvement are in the application of the centrifugal principle; the construction of the valve and seat, and facility of adjustment for different speeds of the engine. As will be seen by reference to the cut, the balls, two in number, instead of being attached to the vibrating arms which transmit motion to the valve, are carried by stout flat springs, whose curvature and tension are determined by actual experiment, and which are rigidly secured at one end to the revolving sleeve, which receives its motion from the shaft of the engine in the ordinary manner, by pulleys, belt or miter gears. The sleeve also supports the vibrating arms. On the free end of the spring which carries the ball, and back of the center of the latter, is a pocket for the reception of the lower or free end of the vibrator.

The motions of the balls resulting from the use of this device differ materially from those of the vibrating form. The line of expansion of the circle, owing to the peculiar curvature of the spring, assimilates a radius of the circle of rotation, and is parallel with its plane, which is stationary, though of course invariably at a right angle with its axis, while a ball attached to a vibrating arm has its line of expansion in its arc of vibration and in the plane of the axis of rotation, this necessarily changing its position in a line parallel with its axis. The advantages arising from this method of suspending balls are:

First. That as it is not affected by gravity it can be used with equal facility in any position, whether vertical, horizontal, angular, or even upside down, and can, therefore, be applied to marine and other engines which are subjected to continual change of position.

Second. By relieving the vibrating arms from all duty except the actual raising and lowering of the valve, which requires but slight motion on its axis and very little power, there is a saving of wear, and thus the great point of durability is gained. Many governors which work well when new have their effectiveness totally destroyed by the combined lost motion resulting from the rapid wear on their several bearings.

The bearing which carries the revolving sleeve is hollow, and contains an inner sleeve through which the valve stem passes, and which, by means of a feather or sliding key, is restricted to a longitudinal motion. At its top there are two collars, the lower one of which is stationary, but the upper is adjustable by means of a hand nut on the valve stem. By this arrangement all lost motion on the end bearings of the vibrators can be taken up. These bearings are simply pivoted or oscillating rectangular blocks of hardened steel, held between the jaws at the end of each vibrator. Their oscillation compensates for the curvature of motion of the latter. The valve stem having a screw thread cut on the upper portion, passes through this inner sleeve, having a nut of corresponding thread. By means of a handle at top of the stem the valve can be adjusted to any desired increase or decrease of speed while the engine is running by simply slacking the hand nut, and turning the valve stem to raise or lower the valve, as the case may be, after which the nut is screwed firmly against the collar. As it is frequently necessary to alter the speed of engines temporarily, this simple arrangement is a great convenience.

The valve and seats are made of a composition which the manufacturers claim will most effectually resist the cutting action of steam. The seats are of one piece, in the form of a bushing or cylinder, having suitable openings to admit of the free passage of the steam, and are fitted steam tight at the ends only to the interior of the outer casing shown in the cut. It is so constructed that the inequality of expansion between the two metals does not affect the seats.

The valve is cylindrical in form, and has no steam passages or ports through it, the steam simply passing by the ends or discs to the interior of the cylinder, thus establishing a balanced pressure. By means of a delicate spring the weight of the valve is supported, consequently the work to be performed by the governor is very light, so as to remove nearly all strain which, on most other valves, causes the wear and tear.

The manufacturers also claim that the large area of valve opening, in proportion to the ball-motion, obviates in a great measure the very serious feature of wire-drawing the steam, one of the worst qualities of throttle governors. The governor may be seen in space D 10, Cols. 74 and 75, Machinery Hall.

The water system of Dubuque is quite a novelty. In one of the bluffs a lead mining company met obstruction from water, and to obtain relief the bluff was tunneled, when it

was found that a copious fountain had been struck which ran to waste for several years. But the water was most excellent, the supply exceedingly liberal, and the head so elevated that the idea of utilizing it was seized by a company, the property purchased, and a system perfected which gives the cheapest and best water supply known in the country, furnishing the city for all purposes at an expense of \$8000 per year. There is also a sufficient supply to be used for water-power.

## Machinists' Tools at the Centennial.

(Continued.)

THE BROWN & SHARP MFG. CO.,

of Providence, R. I., have an exhibit of machinists' tools, comprised mostly of special machinery, located on south aisle, near the Corlies engine. It is in charge of Messrs. Kelly & Ludwig, the Philadelphia agents for the company. The character of workmanship on all the machines included in the display is of the

finest and most accurate kind, which has earned for the company a world-wide reputation. A universal grinding machine for grinding all kinds of circular work by means of solid emery or corundum wheels, up to 12 inches diameter, is made with frame or base having a traversing slide, having transverse as well as longitudinal feeds and adjustments. By means of an additional slide the machine will admit of straight and curved taper adjustments without changing the line of centers, which are regulated by worm and segment, the latter being graduated in degrees. A special chuck for holding work requiring internal grinding is furnished with the machine. A universal milling machine having an index attachment for cutting gears of any pitch up to 13 inches diameter is shown, together with vice and chuck for holding work which cannot be placed upon the centers. The machine has all necessary adjustments, and automatic feeds in every direction, including right and left spirals. Two turret screw machines, sizes No. 1 and No. 3, contain the latest improvements for convenience and rapidity in the manufacture of machine screws of all kinds. No. 1 is suitable for general use in machine shops, making the finished screws from bar iron, beside drilling, tapping and facing one side of nuts, fittings for sewing machines, cotton machinery, etc., etc. The No. 3 machine is intended for the smaller sizes of screws, nuts, &c., used in the manufacture of sewing machines, guns, pistols and similar work. The tapping machine is intended for tapping small holes in gun work, &c., and is furnished with an automatic stop and reverse motion. A screw finishing machine is for finishing screw heads and all kinds of small hand tooling. The screw polishing machine is made with revolving spindles, having chuck for holding work, and a hand rest. The spindle and journal boxes are made of hardened steel, and are inclosed to keep free from emery used in polishing. A specialty of the company is all the necessary appliances for cutting gear teeth, including their patent mills, index plates, cutter grinders, &c. A very useful tool which will be appreciated by machinists generally, is intended for performing the disagreeable work of truing up grindstones, which it accomplishes very effectively without dust, the water being allowed to remain in the trough. It is made with a hardened steel roll, having a V screw thread cut on the face, and the journals well protected from grit. It is clamped to the top of the trough, and adjusted to the stone by a hand-wheel and screw. When the thread becomes worn it may be recut

as often as required. The company have also an exhibit of small tools, such as United States standard scales, squares, gauges of all kinds, &c., which will be noticed when the class to which they belong is under consideration.

J. HAMMOND GRAY,

of Philadelphia, Pa., exhibits one of the larger sizes of his patent screw machine; also a full line of samples of the different varieties of work of which it is capable. The machine shown is intended for general shop use, for sizes from the smallest screws ordinarily used to bolts and studs up to one inch diameter. The head containing the different tools for the several operations necessary in making a finished screw from bar iron, revolves horizontally, and is, in this respect, different from the turret machines, in which the axis is vertical. The hollow mill for turning or milling the body of the screw (which is done by a single operation) contains but one cutter, which may be detached when dull and ground on an ordinary grindstone. These cutters are furnished all ready for use, requiring

the improvements and conveniences of power tools which can be profitably applied to machines of this class. The exhibit includes a 12 inch swing engine lathe for screw-cutting for pitches of threads from 6 to 60 per inch. A treadle and four speed cone fly-wheel are attached. A foot-power hand lathe of 9 inches swing has also treadle and fly-wheel complete. Several other sizes of lathes for foot and power, among which are a 9 inch hand lathe, and a similar one on short legs for using on the work bench. An upright lever drill, also for bench use, appears to be a very handy tool for light work. A power post drill, being, with the exception of having no base, what is usually known as the goose-neck column pattern, is intended for fastening to a wooden post and economizing floor space. It has a radial arm carrying a revolving table, and having a rack and pinion vertical adjustment. There is also a column drill of the same size and design, but having the full length column and base plate. Messrs. Kelly & Ludwig are the Philadelphia agents for the firm, and are in charge of the exhibit. The location of the space is in Sec. C, Col. 29, Machinery Hall.

## Working Heavy Guns.

The Engineer says that an official trial was made recently at the Royal Arsenal, Woolwich, of an apparatus for working heavy guns by means of steam-power, from which great advantages are expected to result. "A full-sized model of a casemate battery had been constructed in the mounting ground of the royal carriage department, and in it had been placed one of the 38 ton guns recently fired at Shoeburyness, the aid of steam-power being ingeniously brought to bear in the mounting of the gun and its appurtenances, as well as in their subsequent action, by Mr. Butter, manager of the carriage department, by whom the apparatus has been designed and prepared. The machinery consists principally of a bevel wheel arrangement inserted in the bed of the platform under the carriage, and it is found that an engine of about 8 horse-power is sufficient to work it. The gun was traversed right and left with great facility. It was run back, sponged and loaded, all by steam-power alone, four or five workmen being sufficient to work the machinery. The shot was conveyed to the muzzle of the gun by an overhead traveler, and was then met by the head of a rammer which is worked by a peculiar chain from below. The chain has its links united by a side joint which gives it flexibility on one side only, and converts it into a stiff bar when turned on its back, thus enabling it to drive the shot home, and then return to its place in a coil under the gun." The working of heavy guns by steam, it would seem from this, is a novelty in England. In this country it is no new thing. Col. Stevens, when he first designed the Stevens Battery, proposed to load and train all the guns by steam-power, and since that time several plans for the same purpose, we believe, have been perfected.

## An Englishman on Train Brakes.

We quote below from a letter to the London Times upon railway brakes, which well describes the state of things prevailing in England. To this matter English scientific magazines have repeatedly called attention, yet the slow-going directors do not seem to understand nor care. It would seem that the cost of accidents alone would be enough to make the value of the different descriptions of American power brakes apparent to English railway managers. English and American railways present, at one point, a marked and, to an Englishman, a humiliating contrast. We have failed to establish any proper control over running trains. The Americans have established a control which is almost perfect. After 50 years' experience

we still employ for stopping our trains the rude and ineffective methods which were in use at the very dawn of railway traveling. The Americans employ a mechanism which bears to ours about the same relation which the breech-loading rifle bears to the flint lock and smooth bore, or to the bow and arrow of the past.

When the driver of an English train sees danger before him he shuts off steam. His fireman begins in haste to turn a lever. The guard, warned of impending peril, makes his way as quickly as possible to a similar lever at another part of the train. In 10 to 15 seconds the combined efforts of fireman and guard have applied the brake to 14 wheels, probably one-fourth of the number present in the train. Meanwhile, the space which intervenes between the rushing train and the obstacle which threatens its destruction has diminished with fearful rapidity. An English train running at full speed cannot be brought to a stand under 1100 or 1200 yards, and that is seldom afforded in cases of accident. Ordinarily, the feeble action of our brakes is cut short by a shattering collision, and the death or injury of many of the passengers.

In presence of similar danger the American driver touches slightly a little handle which stands up before him. In less than two seconds every wheel in the train is grasped by a powerful brake, and before the train has traversed a distance greater than  $1\frac{1}{2}$  times its own length it is brought to a stand. A train running even at our high English speed is stopped easily in 15 seconds, and within 600 feet of the point where danger was discovered.

Many accidents occur with us from wagons breaking away upon inclines and running back uncontrolled. The American brake renders such accidents impossible. The separation of one portion of the train from the rest causes, without any human agency, the instant application of a brake to every wheel in both sections. Last week an accident of this class occurred on the Midland line. The American brake would have had the whole train at a stand within a few seconds of the separation. As it was the driver held on his way ignorant that anything was wrong, and his disjoined wagons followed him on a down grade. When at length he stopped they struck him with great violence. Just as the collision occurred the Scotch express, which on the Midland is fitted with an American brake, rushed past at full speed. One of the carriages struck the projecting debris of the wreck. That contact put the brakes on to the whole express train almost before the driver was aware of the accident.

The American conductor has power to apply the brakes from any car of the train without waiting for the concurrence of the driver. The same privilege is extended to the passengers, but few of them are aware of it, and it is never availed of. The conductor applies the brake without requiring steam to be turned off. So powerful is this brake that the stoppage of the train is not perceptibly delayed even by the impelling force of the steam. I conversed recently with many drivers and conductors of the American trains upon the subject of brakes. Their testimony was unanimous and most emphatic. Not one of them would consent to take charge of a train which was not fitted with a continuous air brake. It was curious to hear a rugged engine driver in the wilds of Kansas or Nebraska declare that he would not expose himself to the risks which the supineness or parsimony of railway directors still lays upon the whole English people.

It costs \$138 (about £25) to fit one of the large American cars with the air brake. But I am assured that it saves its costs annually by the prevention of accidents. Railway traveling has been much less dangerous in America within the last few years. Americans claim that notwithstanding inferiority of roadway and rolling stock, they now travel more safely than we do; and they assert that this is owing in no small degree to the use of an efficient brake. If railway directors think they practice economy by the use of the obsolete and dangerous hand brake, they are surely not wise in their generation.

The air brake has been generally used in America for about four years. During these years how many lives have been lost on English railways, because the driver was not furnished with means to stop his train in time to avoid collision? How many English homes are yet to be desolated before our railway directors will consent to surround with proper defense the precious lives intrusted to their care?

A pneumatic railway, for the dispatch of messages between Paris and Versailles, just completed, is nearly  $13\frac{1}{2}$  miles in length. The tubes, made of brass, are  $3\frac{1}{2}$  inches in diameter and two-fifths of an inch thick. They are laid at a depth of 8 feet from the surface, on a flooring of wood, and are pitched both inside and out.

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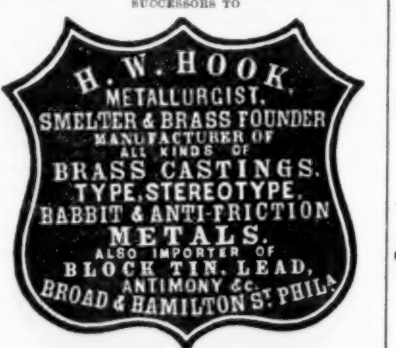
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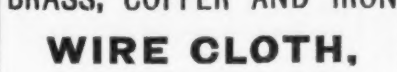
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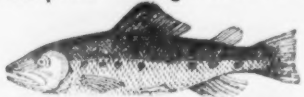
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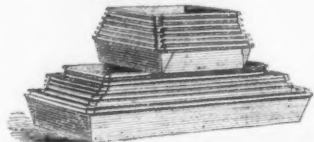
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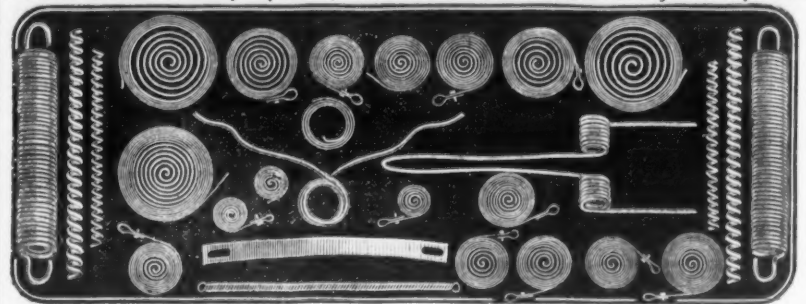
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No. 2, Regular Family size, 10 inch Rolls, per doz., \$60 00  
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Lots of two dozen, \$2.00 per dozen less.

The "Eureka" is a simple, durable, and efficient Clothes  
Wringer, universally acknowledged to be superior to all others.  
We call special attention to its price and merits. It has self-  
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Collar or Bed-spread.  
The friction principle upon which it is constructed has  
been proven the best in use.  
Taking into consideration the quality of all material used,  
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It is also for sale in 1, 5 and 10 lb. packages by Hardware Dealers generally through-  
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**PERFECT COMBUSTION BY  
AN OXYGEN BLAST.**

By this process oxygen is imparted to the blast simply by its passage, on its way to the place of combustion,  
through a chamber or vessel holding an oxygen compound, from which, by the agitation of the air thereon, oxygen  
is set free and thus imparted to the blast. The required volume of this blast is one-half less. The com-  
bustion becomes perfect therefrom, all the carbon in the fuel being converted into a high and concen-  
trated heat, without smoke or gas, but that of carbonic acid, being formed. Beside a saving of fuel,  
obtainable in all cases by this blast, advantages arise from its varying according to the appliance of the heat.  
—On Forge Fires it gives a clean and intense heat, free from all sulphurous gas, whereby a better and  
quicker welding is had and time saved. On fires under boilers for making steam, the saving in fuel is 25 per  
cent. and over, the working capacity can be increased in same ratio by reason of the intensified and accel-  
erated combustion, which latter also overcomes the disadvantages connected with the use of fine dust  
and impure coal. Castings from a cupola in which the fire is sustained by this blast become of superior  
quality, uniformly soft to work and very tough, resembling wrought iron and steel; they forge hot  
and cold to some extent; the iron becomes strengthened and purified, being freed from carbon and sul-  
phur. For blast furnaces this process becomes of vast importance—it saves fuel, increases the work-  
ing capacity, perfects and reduces the cost of the metal, makes sulphurous and other impure ores fit for  
use. The serious drawbacks arising from imperfect combustion, caused mainly by otherwise uncontrollable at-  
mospheric influences, are overcome. The work of a puddling furnace and that of decarbonizing the iron,  
both for wrought iron and steel purposes generally, is much simplified, shortened and perfected as to pur-  
ity of product: the work of so many hours is reduced to as many minutes by this process. The process  
has the merit of being simple and easily applied, and with but very little expense, and this only for the  
needed chamber or vessel and its connection with the blast pipe; the vessel may be a wooden keg, barrel or  
larger cask or tank, properly lined, from two gallons for a single forge fire up to 500 gallons and over, according  
to the blast in use. The cost of the oxygen is conditioned by, and made subject to, its effect—it is but a small  
item compared to the gains from it. Although this process has been in practical use for over a year,  
the inventor felt reluctant to offer it to the public before having its utility and practicability fully estab-  
lished, beyond any and all contingencies, not from a theoretical standpoint, but from the testimony of man-  
ufacturers who have used the process this last year, and whose standing and reputation as manu-  
facturers are of the highest order, and such as to entitle them to the consideration of others. For  
further information, and for small specimens of castings from this process, address

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**Steam Engine Cut-offs at the Centennial.**

(Concluded.)

THE "WHEELOCK" ENGINE,

manufactured by Jerome Wheelock, Worcester,  
Mass., may be seen in operation in Agricultural  
Hall, where it is used for driving one of the  
lines of shafting for operating the machinery  
on exhibition. It is designed with a view to  
overcoming what the manufacturers consider  
to be radical defects in the action of the "Cor-  
liss" and "Harrie" Corliss engines, the prin-  
cipal one of which being the necessity for the  
use of four parts (separate steam and exhaust  
at each end of cylinder), and the consequent  
blowing through while the exhaust is open in  
case the steam cut-off valve happens to leak.  
Experience in the use of these engines will de-  
termine whether or not the point is well taken,  
while for ourselves we refrain from expressing  
any opinion on the subject, comparative criti-  
cisms not being within our province. Without  
doubt the Wheelock valves are admirably  
adapted to the accomplishment of the object  
for which they were designed, the principles  
involved in their action covering several im-  
portant points which are absolutely essential  
to the attainment of a maximum degree of  
economy in the use of steam. A front view of  
the engine bears a close resemblance to the  
Corliss type, although the absence of the cut-  
off valves at the top of cylinder removes the  
necessity for the square corners, and allows of  
a more symmetrical design than can be obtained  
where the latter occur. Another noticeable  
difference is in the guides, which—although  
like the Corliss, parallel with the plane of vi-  
bration of the connecting rod—have in place  
of the V bearing a curved one, made by boring  
them on the line of the axis of the cylinder,  
thus insuring perfect accuracy and preventing  
any possibility of the piston and cross head  
being out of line in either direction. The  
valves are four in number, a main and a cut-off  
valve at each end of the cylinder, the former  
being operated by an eccentric in the ordinary  
manner, while the latter, although receiving  
motion from the same source, are controlled by  
the governor, and are therefore automatic in  
cutting off. Although all are of the rotary, or  
more properly the oscillating, form, the main  
valves perform both functions of induction  
and eduction while the cut-off valves have but  
the one duty implied by the name. The seats  
of the latter are as close to the backs of the  
main valves as is consistent with the proper al-  
lowance of metal between, which, in connection  
with the position of the main valves directly  
under the end of the stroke, with only the thick-  
ness of the cylinder between, reduces the per-  
centage of clearance to a very low figure. As  
after the opening of the exhaust both the  
main and cut-off valves at that end of the  
cylinder are closed to the steam, a double bar-  
rier is opposed to any chance of leakage or  
blowing through of live steam into the ex-  
haust, this feature constituting the main claim  
of superiority. The valve motion is very in-  
genious and effective, although of the utmost  
simplicity. The cut-off is effected by tripping  
the valves (the necessary dash-pots being at-  
tached to prevent jar) by means of lugs on the  
lifters coming in contact with the spring  
catches which engage rock arms on the valves.  
The position of these lugs in relation to that  
of the piston is regulated by the governor (the  
latter being of the centrifugal form and driven  
by belt from crank shaft), whose variations are  
transmitted to a rod attached to the lifters, giv-  
ing it a lateral motion, which, by drawing the  
lugs forward as the speed increases, shortens  
the point of cut-off by tripping the valve  
earlier, and vice versa. The action of the en-  
gine is exceedingly smooth and quiet, and gives  
evidence of the careful workmanship employed  
in its construction. The whole finish of the  
machine is excellent, and its fine appearance  
occasions much admiration from visitors.

THE WOODRUFF & BEACH CUT-OFF ENGINE,

manufactured by the Hartford Foundry and  
Machine Company, successors to the Woodruff  
& Beach Iron Works, of Hartford, Conn., may  
be seen in operation in Annex No. 2, Machinery  
Department, where it is used to drive the line  
shafting. After the Corliss this is probably  
the oldest of the variable cut-off engines now  
in the market, and from its excellent record as  
to durability and economy, appears to be  
worthy of a high rating in the scale of com-  
parative merit. One of the first points to  
strike an observer is the absence of complica-  
tion in the valve motion, and the ease with  
which access to all the working parts may be  
obtained. The cylinder, guides, and, in fact,  
all of the several parts, excepting the outer  
pedestal bearing, are contained by the horizontal  
bed plate, which is made very heavy to insure  
perfect rigidity. At the bottom of the cylinder  
is the exhaust valve, communicating with the  
interior of the former by its own ports or pas-  
sages, which are entirely separate from those  
of the steam valves. It is a hollow cylindrical  
slide, having a very simple and effective ar-  
rangement for taking up wear and preventing  
leakage. An equilibrium of pressure is main-  
tained by the exhaust taking place through the  
interior of the valve, and as the stroke is very  
short the liability to wear is slight. The mo-  
tion is derived from a transverse shaft under  
the center of the guides carrying an eccentric,  
and driven by means of bevel gears, as here-  
after specified. Owing to the position of the  
exhaust openings at the bottom of the cylinder,  
and their ample size, the exhaust is very free,  
and the discharge of any water that may ac-  
cumulate from condensation or from priming  
in the boilers is rendered easy, and all danger  
of accident from this cause obviated. On the  
back, at each end of the cylinder, are the steam  
chests containing the steam valves. The latter  
are of the double poppet form, having beveled  
faces and seats, and are placed in a horizontal  
position parallel with the axis of the cylinder,

the stems projecting inward. Placed centrally  
between the valves is the governor (centrif-  
ugal), the spindle of which passes through a  
compound eccentric, carrying a movable cam-  
lug, which by its rotation gives the opening  
or outward motion to the valves, in which di-  
rection it is positive, while the closing, although  
controlled by the cam, is effected by the pres-  
sure of the steam upon the unbalanced area  
exposed at the outer end, assisted by a spiral  
spring. In the bore of the inner eccentric  
is an inclined or spiral slot for the recep-  
tion of a key attached to the gov-  
ernor spindle, from which the eccentric  
receives its motion. As the key is raised or  
lowered by the variations of the governor, the  
inner eccentric is turned to the right or left, and  
the cam lug moved in or out, as the case may  
be, thus giving the necessary opening to the  
valve, and cutting off the steam at the proper  
point to allow of a proper degree of expansion.  
As the cam lug is at all times in the same rela-  
tive position to the outer shell of the eccentric,  
the lead of the steam valves is not affected by  
the variations. Owing to the shape of the cam,  
the motions of the valves in opening and closing  
are very quick, and with the exception of a  
slight "click" when seating are noiseless. A  
longitudinal shaft supported by bearings at-  
tached to the bed plate, and driven by the re-  
quisite spur and bevel gears from the crank  
shaft, transmits the rotary motion to the trans-  
verse shaft carrying the exhaust eccentric, and  
also to the governor and steam valve motion.  
Any desired variations of steam lead can be  
made by means of separate adjustments on the  
end of valve stems, without the necessity for  
changing the position of the eccentric. The  
power required to work the valves is very slight,  
and as the cam lug and the ends of valve stems  
are of hardened steel, the engine may be run  
for years without any perceptible wear at this  
point.

ROBERT WETHERILL & CO.,

of Chester, Pa., exhibit a very fine specimen of  
the Corliss horizontal type of engine, contain-  
ing all of the latest improvements. A very  
excellent feature of the engines made by this  
firm is the flat cast iron bed plate, which by  
tying the feet of cylinder and housing together  
at the bottom gives greater rigidity, and lessens  
the danger of springing the housing and throw-  
ing the bearings out of line when setting it on  
the foundation. As the principle of the Corliss  
engine—the pioneer of automatic cut-offs—is so  
universally known, any description of it would  
be superfluous. The workmanship and finish  
of this engine are excellent, and reflect much  
credit on the builders. It is to be regretted  
that it is not shown in operation, as without  
doubt its action would fully coincide with its  
appearance. The exhibit is located in the space  
east of the Weimer high speed blowing engine,  
which has a way of its own of making its  
whereabouts known to visitors.

MIRRELESS, TAIT & WATSON.

In the British section of Machinery Hall the  
above firm, of Glasgow, Scotland, exhibit in  
connection with their large sugar mill a Corliss  
beam engine, having the style of cut-off origi-  
nally adopted by the inventor.

In the Belgian section is a pair of geared hori-  
zontal condensing engines of the recent Corliss  
type, which as specimens of workmanship will  
compare favorably with the best of either foreign  
or American build. The condensers and air  
pumps are placed directly in the rear of the steam  
cylinders, the piston rods passing through the  
back cylinder heads and connecting directly  
with the air pump pistons. By this means the  
necessity for complication in operating the air  
pumps is avoided, and the engine rendered as  
compact and simple as possible. From their  
prominent position on the main aisle, the fine  
appearance due to excellent finish causes these  
engines to be much admired, and considerable  
astonishment is expressed at their style of  
finish, which is unusual in connection with this  
class of machinery in European practice.

GOLDIE & McCULLOCH,

of Galt, Ontario, Canada, exhibit in the space  
on main aisle, directly opposite the main en-  
trance to the building, a horizontal variable cut-  
off engine, which appears to embody several  
very meritorious features. The design is good,  
and excellent judgment is displayed in the dis-  
tribution of metal in both the stationary and  
working parts. The main valve is of the ordi-  
nary slide form, made without steam lap, and  
operated in the ordinary manner by an eccentric  
on the crank shaft. The cut-off valves, one for  
each end of cylinder, are gridiron slide valves,  
having a vertical motion on independent steam  
chests placed upon the back of that of the main  
valve. Their motion is derived from a longi-  
tudinal shaft revolved by gearing from the  
crank shaft. It is placed directly under the  
centers of the valve stems, and carries two  
spiral cams of the requisite form for raising the  
valves and dropping them quickly, a dash-pot  
or air cushion being attached to prevent slam-  
ming. A bevel gear upon the cam shaft drives  
the governor, which is of the centrifugal form,  
and capable of developing considerable power.  
The rod of the governor connects by means of  
an L lever and rods with the lifting cams. As  
the speed increases the cams are moved back,  
and the spiral being on the drop side, the in-  
terval of opening of the valve is decreased to  
the required point. In case of any sudden  
lightening of load on the engine, the positive  
motion of the governor would move the cams  
so far back as to clear the valve stems alto-  
gether and allow them to remain closed until  
the speed became reduced. The raising side of  
the cams is necessarily parallel with the shaft  
to insure a uniform lead, and the highest point  
is reached as quickly as possible without caus-  
ing undue friction. On the drop side the  
angle of the edge is a radius of the circle,  
and as turning the cam backward would break  
the valve stems, a clutch is provided on the  
shaft which admits of motion in but one direc-  
tion.



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Orders solicited for  
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Common and Refined Iron Rods,  
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Ovals, &c., &c.  
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Orders filled from stock at lowest prices.

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making the most durable Roof in the market, not  
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soldered tin roofs to leak. Price only \$6.50 per square,  
measured on both sides, packed ready for shipping.

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AND  
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Galvanized Bars and Chains for Cemetery  
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LAP WELDED BOILER FLUES.  
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Pig Iron, Lead, Block Tin, and other  
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Anthracite & Charcoal Pig Irons,  
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**CUT NAILS,**  
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A Variety of Brands, including

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**BARS** suitable for Steel of all grades, Wire, Shovels,  
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**CHARCOAL PIG IRON** for Bessemer and  
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have on hand, and offer for sale, the following:  
Scotch and American Pig Iron, Wrought, Cast and  
Machinery Scrap Iron, Car-Wheels, Axles and Heavy  
Wrought Iron; also old Copper, Composition, Brass,  
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**Cut Nails and Spikes,**  
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Of Finest Qualities. METALS.  
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Anthracite, Charcoal and Scotch Pig Irons, Ingot  
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(Also, in Rolls for machine work.)  
Ground Emery, Corundum & Flint, Glue & Curled Hair, Hair Felt, & Felt-  
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Situated on the line of the Pennsylvania Rail road,  
at the western base of the Alleghany Mountains, are  
the largest of their class in the United States, and  
are now prepared to make

1800 TONS PER WEEK,

Of Iron and Steel Railway Bars.

The Company possesses inexhaustible mines of  
Coal and Ore, of suitable varieties for the production  
of Iron and Steel Rails of

BEST QUALITY.

Their location, coupled with every known im-  
provement in machinery and process of manufacture  
enable them to offer Rails, when quality is con-  
sidered, at lowest market rates.  
The long experience of the present Managers,  
of the Company, and the enviable reputation  
they have established for "CAMBRIA RAILS,"  
are deemed a sufficient guarantee that purchasers can,  
at all times depend upon receiving rails unsurpassed  
for strength and wear by any others of American or  
foreign make. Any of the usual patterns of rails  
can be supplied on short notice, and new patterns of  
desirable weight or design will be made to order.  
Address,

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## PATENT Planished Sheet Iron.

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Guaranteed fully equal in all respects to the

IMPORTED RUSSIA IRON,

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**Wrought Iron Roof Trusses, Beams, Girders & Joists,**

and all kinds of Iron Framing used in the construction of Iron Roof Buildings.

**DECK BEAMS, CHANNEL, ANGLE AND T BARS**

curved to template, largely used in the construction of Iron Vessels.

**PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,**

For Top and Bottom Chords of Bridges.

**Railroad Iron, Street Rails, Rail Joints and Wrought Iron Chairs.**

**REFINED BAR, SHAFTE, and every variety of SHAPE IRON made to Order.**

Plans and Specifications furnished. Address,

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Manufacturers of SPOKES, AXE, PICK, SLEDGE, HAMMER, HATCHET and other

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## J. & J. Rogers Iron Co.,

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**Blooms & Bars**

For Conversion into Cast Steel.

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Exclusively from Palmer Ore.

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Wrought Iron Buildings, Wrought Iron Bridges, Car-

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Corrugated Sheets of all sizes manufactured by Moseley

Iron Bridge and Roof Co., No. 5 Bex St., N. Y.

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**Iron, Nails & Spikes.**

YOUNGSTOWN, OHIO.

**OLD DOMINION**

**Iron and Nail Works Co.,**

**RICHMOND, VA.**

**R. E. BLANKENSHIP,** Commercial Agent,

Manufacturer

**NAILS AND BAR IRON.**

Bars, Rods, Horse Shoe Bars, Nut and

Rivet Iron, Spike Rods, Sharpening, Bridge

Bolts, Ovals, Half Ovals, Half Rounds, &c.

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**Fruit Can Trimmings.**

The superior quality and cheapness of the production

of my **PATENT FRUIT CAN TRIMMING** (Patented April 6, 1875), having induced

certain parties to infringe my patent, I have com-

mitted them to cease manufacturing, and I will pro-

ceed against any one who may infringe in the future.

**The Very Best**

**FRUIT CAN TRIMMINGS,**

(3 1-2 Inch Opening.)

Are manufactured under process patented April 6,

1875, at the

**WOODBURY STAMPING WORKS,**

**WOODBURY, N. J.**

I am making arrangements to the end that at least

one prominent house in all the principal cities of the

United States will keep a supply of my trimmings,

for the trade.

**J. M. PATTERSON,**

Sole Manufacturer,

**WOODBURY, N. J.**

Samples furnished free upon application ac-

companied by business card.

**JOHN CARVER,**

Manufacturer of

**Caulking Irons,**

**COTTON, FREIGHT & Hay Hooks, &c**

288 Monroe Street, NEW YORK.

With Diaston's Saws.

4 Sizes.

Sold by Hardware Trade.

LANGDON MITRE BOX CO.,

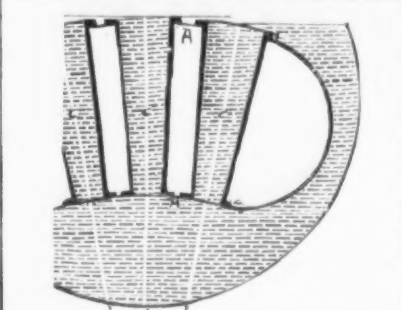
Sole for Circular, Millers Falls, Mass.

## New Patents.

We take the following abstract of new  
patents, recently issued, from the official re-  
cord:

## STEAM BOILER.

To Chas. J. Galloway and Chas. H. Holt, Man-  
chester, England.—Aug. 8.—An internal flued or  
Cornish boiler, having the upper and lower  
sides of its flue curved to one and the same  
center, external to the flue, in combination with



transverse water tubes radiating from the same  
center from which the curved upper and lower  
sides are struck.

180,701.—Steam Pump.—Ezra Cope and James  
R. Maxwell, Hamilton, Ohio, and James R.  
Paddock, Chicago, Ill.—Aug. 8.

180,720.—Vehicle Spring.—C. B. Koon, Auburn,  
N. Y.—Aug. 8.

180,725.—Car Wheel.—Wm. McConway, Pitts-  
burgh, Pa.—Aug. 8.

180,730.—Rock Drill Chuck.—George G. Roe  
and Wm. F. Tallman, Mineville, assignors of  
part of their right to Geo. H. Reynolds, New  
York, Walter Tefft, Mineville, and Aaron Nall  
and O. S. Presbrey, Cheever, N. Y.—Aug. 8.

The momentum of each stroke causes the  
plain band to tighten on the spring jaws and  
hold the drill. The end of the drill abuts  
against the end of piston secured by a screw  
thread within the chuck.

180,769.—Wagon for Delivering Coal.—Anthony  
Iske, Lancaster, Pa.—Aug. 8.

By the elevation of the forward end of the  
bed, the coal is discharged through a telescopic  
chute attached by chains to the end gate.

180,798.—Machine for Compressing Blooms and  
Puddlers' Balls.—William Sellers, Philadel-  
phia, Pa.—Aug. 8.

Rolls for converting the bloom or ball into a  
billet; a hollow swaging cylinder resting on a  
hydraulic ram in front of the rolls; a hydraulic  
ram for compressing the billet endwise while in  
the cylinder, and a hydraulic ram for ejecting  
the billet. The swaging cylinder, with billet in  
it, having been brought to the proper position,  
the compressing ram enters it, and upsets and  
condenses the billet, after which the cylinder  
is elevated, and the ejecting ram enters and  
expels the billet, and at the same time a stirrup  
attached to the ejecting ram falls over and em-  
braces another billet lying in the roll table, and  
on the backward movement of the ram draws it  
into the swaging cylinder, to be in turn com-  
pressed and ejected.

180,831.—Pump.—Wm. S. Blunt and Edmd.  
Blunt, Jr., New York, N. Y.—Aug. 8.

By changing the valve the pump can be con-  
verted into a lifting or force pump chamber by a  
separate bearing bracket. The air chamber is  
so arranged that the handle may be placed at  
any desired angle with the discharge nozzle.

180,834.—Anvil Vice.—Jos. Bolt, Benicia, Cal.—  
Aug. 8.

180,850.—Bit Stock.—William F. Curtis, Miller's  
Falls, Mass.—Aug. 8.

The spring jaws are moved out and in by a  
clamping shell or nut, the interior of which is  
bent away inward at its front part.

180,867.—Bench Plane.—Jackson Gorham, Craw-  
fordville, Ga.—Aug. 8.

A smoothing plane is provided with a stud  
upon its top surface near the heel of the stock.

180,869.—Device for Cutting Screen Threads.—En-  
gene W. Green and John Thomson, Ports-  
mouth, Ohio.—Aug. 8.

180,899.—Lock Work Attachment for Clocks.—  
John J. Marcy and Daniel W. Kissau, Bridge-  
port, Conn.—Aug. 8.

In a striking clock, the spring lifting pin or  
device on the center shaft, constructed to  
swivel for the purpose of passing the lifting  
hook when the hands of the clock are turned  
back.

180,928.—Nail Plate Feeder.—Wm. H. Ritten-  
house, Norristown, Pa.—Aug. 8.

The mechanism for intermittently turning the  
nipper barrel continuously in the same direc-  
tion can be connected and disconnected, when  
desired, with the lever for operating the header  
by means of a latch, which engages with a pin  
on the inner side of the said lever. The barrel  
is slotted longitudinally, and carries within it  
the nipper, which is fed to the cutters by a cord  
and weight, and is peculiarly connected to a  
ring, a pin projecting from which enters the  
slot in the barrel, and causes the ring and nip-  
per to be rotated with said barrel.

180,956.—Flue and Tubular Boiler.—A. J. Stev-  
ens, Sacramento, Cal.—Aug. 8.

The flame from the fire chamber passes into  
an intermediate combustion chamber; thence  
into a secondary combustion chamber located  
above the former, and in which the cooler un-  
consumed gases are ignited. Expansion and  
contraction of the tubes is provided for by the  
tube heads forming the sides of said combus-  
tion chambers.

180,965.—Saw Lock.—Sylvester J. Tucker Rich-  
mond, Va.—Aug. 8.

The following trade-mark was registered dur-  
ing the week ending Aug. 8:

3,917.—Axe.—George T. Lane and Alfred de F.  
Gale, Troy, N. Y.

"words 'Hurd's' and 'Razor Blade.'"

A proposed safe for vessels is a buoy with  
proper compartments for bullion, jewels, &c.,  
and not liable to be sunk or lost for years, as  
has frequently been the case with ordinary bul-

lion safes when the vessels carrying them have  
been lost. The idea has been patented by J. L.  
Goutey, of New Orleans.

## Industrial Applications of Solar Heat.

BY L. SIMONIN.

(Concluded.)

A steam engine consists of two principal  
parts, the boiler and the engine proper, or mo-  
tor. We suppose that with the boiler employed  
at Tours we can use the common motors; this  
is one of the advantages possessed by the solar  
apparatus, viz., that it does not require a special  
form of motor. At first the inventor employed  
for his demonstrations a double acting engine,  
without either condensation or detention of  
steam, the cylinder of which had a capacity of  
one-third of a liter. This engine performed 80  
strokes per minute, with a steady pressure of  
one atmosphere; it continued to work even  
under a slightly clouded sun. This was later  
superseded by a rotary engine, that is, an en-  
gine with revolving cylinder, which avoids all  
transmission of movement; but the system is  
faulty. Yet this engine worked very well, driv-  
ing at high velocity a little pump for raising  
water; the pump, however, being of weak con-  
struction, became disabled. It is a pity that  
the inventor has never measured the real work  
performed by his engine by means of a dynamometer.

The solar reflector being first of all a furnace  
using fuel that costs nothing is not only of use  
as a means of developing motive force, but can  
also be employed for a multitude of purposes  
—for instance, distilling water to make it fit  
for drinking, concentrating and crystallizing  
saline solutions, preparing alcohol, etc. Five  
liters of wine can be distilled in a quarter  
of an hour by passing the vapor from the ap-  
paratus into a still. The manufacture of alco-  
hol from grain, sugar cane or beet root would  
be equally easy. The steam generated by this  
apparatus can also be employed for cooking  
fodder for cattle. M. Mouchot has devised a  
form of small marmite, quite different from  
his large steam generator. These can be used by  
hunters for preparing their meals, and explorers  
of great deserts will now have something  
beside camel or buffalo chips for cooking their  
viands.

Many and varied are the uses of this curious  
invention. The aeronaut can with its aid propel  
his air ship. Hot air motors and ammonia en-  
gines will be benefited by the use of the solar  
reflector; but it is especially in tropical coun-  
tries that it is destined to find immediate em-  
ployment, in driving the various kinds of ma-  
chinery used in sugar and cotton plantations,  
in distilling impure water to make it fit for  
drinking, in crystallizing saline and saccharine  
solutions, in pumping water of irrigation, in  
manufacturing ice by means of the Carre ma-  
chine, etc. In those countries fuel is scarce,  
firewood is not abundant, and coal, which has to  
be imported from a distance, often from the  
mines of England, commands an exorbitant  
price. Already in southern countries sea salt  
is obtained purely by the action of solar heat.  
In Chili and Mauritius salt marshes are divided  
into compartments, with walls and roof of  
glass, in order to promote evaporation; so in  
the famous niter beds of Iquique, on the coast  
of Peru, the salt might be crystallized by solar  
heat alone.

The cost of a solar apparatus of half  
a horsepower, like that at Tours, does  
not exceed 1500 francs, and, when the  
manufacture is carried on upon a large  
scale, will be much less. By substituting for  
the silver plate, which is the most costly por-  
tion of the reflector, brass with a thin coat of  
silver, which will serve the purpose equally  
well, a considerable reduction of cost is effected.

As the insulation surface, and, consequently,  
the power of the apparatus is quadrupled when  
the diameter of the mirror is doubled, it will  
be easy to construct large generators without  
adding very much to the cost, or complicating  
the mechanism. The one thing to be avoided  
in this case will be too great intensity of heat.  
It cannot be objected that the conical reflector  
takes up too much room, for a common steam  
engine occupies considerable space likewise  
with its long boilers and its high chimney; as  
for the motor, properly so-called, and the con-  
trivances for transmitting the power, they are  
the same in both cases.

The strongest winds, at least in our latitudes,  
have no action on the reflection of the solar  
heat, or upon the mirror itself, which is not  
shaken by them. This is an important point,  
for this is an apparatus which must always be  
exposed in the open air. In regions where the  
wind storms are more severe than they are  
here, the reflector might be staid and strength-  
ened with iron ribs, so as to resist the most  
violent cyclones. It has been demonstrated  
that the bell glass, when highly heated by  
the direct radiation from the boiler, is in no  
danger of breaking, even when a cold rain falls  
upon it, and that it is even proof against hail-  
stones; and now that a process has been in-  
vented for tempering glass and making it  
almost unbreakable, we can, without difficulty,  
obtain bell glasses strong enough for any emer-  
gency.

Experience will hereafter lead to many im-  
provements now unthought of; but, even as it  
stands to-day, the solar engine at Tours is  
ready to pass from the speculations of theory  
to the application of practice. It is neither  
over costly, nor difficult to set up, nor so com-  
plicated as to require great skill in managing  
it; and, from whatever point of view we re-  
gard it, it meets and overcomes all objections.  
We may say that it lends itself to every indus-  
trial use which solar heat can be employed,  
especially in tropical countries where the ab-  
sence of all kinds of fuel for industrial uses is  
severely felt. In the not distant future, in  
other countries, too, there will exist no other

fuel than the sun, no other engines than those  
driven by solar heat. By that time no doubt  
the means of storing up this heat will have  
been discovered, for in our latitudes we shall  
have to make provision against cloudy days  
and seasons of rain, which unfortunately con-  
stitute the major part of the year.

It may appear to be a pleasant paradox to  
say that future generations, after the coal  
mines have been exhausted, will have re-  
course to the sun for the heat and energy  
needed in manufacture and in domestic  
economy. Still, nothing could be plainer than  
this. In our day, when it is probable that force,  
motion, gravity, heat, light, electricity, mag-  
netism are simply modifications of one and the  
same agent, and the effect of the vibrations of  
that impalpable and invisible fluid known as  
ether, the assertion that the sun is the only  
fuel, the only force, must not call forth any-  
where the smile of incredulity. All fuels, all  
forces, are to be regarded as only parts of the  
sun's heat. What is coal? Fossil carbon. And  
was not this carbon fixed in plants by the  
sun's heat, of which it is the equivalent? Under  
the action of solar radiations the carbonic  
acid in the atmosphere is decomposed on con-  
tact with plants; the carbon is fixed in the  
plant, and the oxygen goes back into the air  
to serve for the respiration of animals. Hence,  
no sun, no vegetation; no vegetation, no car-  
bon, no coal. Coal in burning gives up the  
solar heat which was stored up in it, and, there-  
fore, it was that on which a locomotive engine  
more Stephenson said: "It is not the coal  
that drives this engine, it is the sun's heat  
stored up in the coal thousands of ages ago;  
locomotives are but the horses of the sun." We  
might make a like comparison with respect  
to wine and the alcohol it contains; and the  
Bordeaux use no mere figure of speech when  
they speak of their admirable Sauterne wine as  
being "bottled sunshine."

When water rises in the shape of vapor, what  
is it that causes it to ascend? The heat of the  
sun. If it comes down as rain, forming tor-  
rents and brooks which feed our mill races and  
drive our mills, what is it that turns the wheel?  
The sun, for it was the sun that in the first  
place raised the water. When the wind blows  
upon the sails of a windmill, or on the sails of  
a ship, what is it that drives the mill or pro-  
pels the ship? The sun, for wind is simply an  
atmospheric current produced by the heating  
of a stratum of air, which being dilated by the  
sun tends to an equilibrium with strata of the  
same density, and hence rises, while a volume  
of cooler air takes its place. And what are the  
tides, the propulsive power of which there is  
some thought of utilizing, whether directly by  
means of water wheels, or indirectly by com-  
pressing air, and so producing a constant supply  
of force? They are a portion of the heat of the  
sun, for the seas are formed by the coming to-  
gether of all those torrents and rivers which  
descend into their common reservoir, the ocean.  
Then, too, the tides are the result of the com-  
bined attraction of sun and moon upon the  
earth. Thus we find that the sun is always and  
everywhere active.

It is, therefore, no paradox to regard the sun  
as the one source of fuel in the future, and as  
the reservoir of force to which generations to  
come will at no distant day have recourse.  
Hence it is that savants and great engineers, as  
Euclid, Archimedes, Hero, Salomon de Caus,  
Buffon, Saussure, Belidor, Evans, Herschel,  
Pouillet, Ericsson, have in every age put to  
themselves the question how it might be  
possible to take from the sun a part  
of its heat for the benefit of this poor globe.

The world will not perish for want of coal,  
yet the coal supply will fail, and that much  
sooner than Ericsson estimated, for the produc-  
tion doubles every ten or fifteen years. It will  
not take thousands of years to exhaust the  
European coal mines, but only hundreds, and  
not very many hundreds either. In England,  
as appears from recent calculations, the supply  
will have been consumed in two or three cen-  
turies at the farthest. Belgium, Germany,  
France, and the other countries of Europe, are  
no better off. The United States of America  
and the north of China have coal enough to  
last for one thousand years, and that is all.  
We must then have recourse to the sun.

It will perhaps be said, "There is electricity."  
Electricity as a mechanical agent is too costly;  
to produce electricity we have to consume  
copper, zinc, and acids. Now, one kilogramme  
of copper, zinc, or acid represents several kilo-  
grammes of coal expended in procuring it. In  
reducing copper ore according to the Welsh  
method, sixteen kilogrammes of coal is con-  
sumed for each kilogramme of copper obtained.  
Hence it were reasoning in a vicious circle to  
suppose that electrical or electro-magnetic  
machines can usefully or economically take  
the place of steam engines. There is only one  
case in which this conclusion would be  
weakened, namely, if with a thermo-electric  
pile we should succeed in decomposing water  
into its elements, oxygen and hydrogen, at  
little or no expense. The problem would  
then be solved, for this would place in the  
hands of all the two greatest sources of  
light, heat, and force—oxygen and hydrogen.  
But, even then, to what should we owe this un-  
expected solution? To the sun, for it is only by  
the aid of a thermo-electric pile (wherein we  
suppose electricity to be produced by solar  
heat) that we could economically decompose  
oxygen and hydrogen; else it would require at  
least as much heat to dissociate them as they  
would yield on recombining—a *petit principii*  
overlooked by those simple inventors who per-  
sist in attempting, by means of ordinary electric  
piles, to solve the great problem of economical  
motors and the fuel of the future.

As for directly storing up solar heat in good  
conductors or absorbents of heat which are  
then to be insulated—for instance, receiving  
the heat in porous black stones which are first  
exposed to the sun and afterward thrown into  
a great reservoir, just as snow is piled up in the  
ice house—it involves no impossibility. These  
stones could be thrown into water, if need  
were, and in this way we might easily attain or  
surpass the temperature of boiling water.



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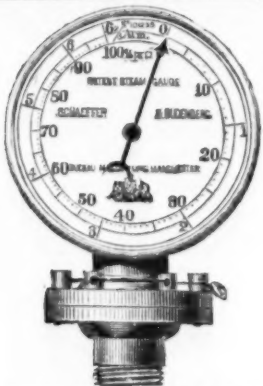
For determining the per cent. of Pure Iron in an  
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termine, the charge must necessarily depend  
upon circumstances.  
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rence..... 6 00  
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soluble Silicious Matter in a Limestone..... 10 00  
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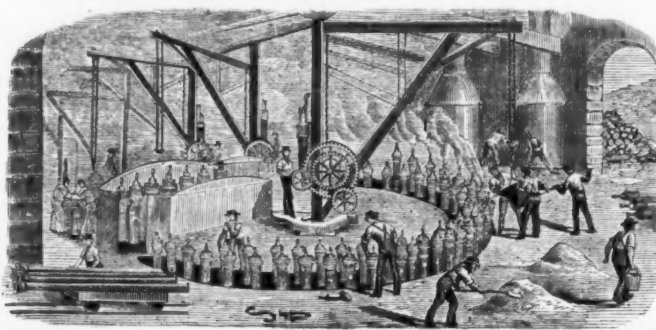
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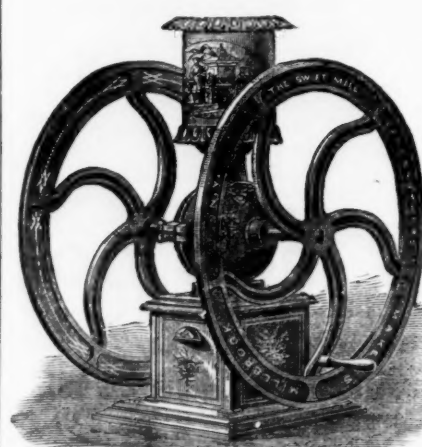
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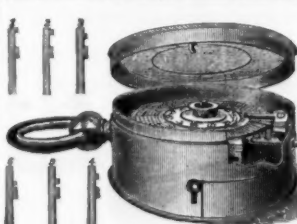
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## Merchant Iron at the Centennial.

(Continued.)

MESSES. REESE, GRAFF & WOODS, of the Fort Pitt Iron and Steel Works, Pittsburgh, in addition to their steel exhibit, of which mention is made under its appropriate head, show samples of their iron, both in its various forms of merchant iron, and worked into shapes and other forms. The bar iron shown is bent and twisted to indicate its toughness and bent to show fiber. Various shapes for agricultural purposes are shown, as well as horseshoes and toe calks. The iron from which the horseshoes are made is rolled on the only rolls in the world, it is claimed, that can roll bar iron with irregular lateral sides. They also display shingle strips, which are largely used in the lumber regions all over the world.

WM. CLARK & CO.,

of Pittsburgh, exhibit at T 66 a very complete assortment of hoop and band iron, together with samples of cotton tie, wagon box and small shape irons, which seem in finish and accuracy of gauge to be worthy of the highest praise, and presuming on the well known reputation of the firm, we are justified in saying that in quality they are the best. In the West the manufacture of hoops has been brought to a high degree of perfection. Whiskey and petroleum may be said to be native to this section of country, and the demand for hoops for barrels for these, especially for the latter, has developed a very large manufacture and brought the product to a high state of perfection. One firm of oil refiners has just given a contract for 4000 tons. The red-short irons made from the Lake Superior ores mixed in the puddling furnaces with the cold-short irons of the Allegheny Valley and western Pennsylvania make a beautifully smooth and polished hoop, and at the same time a very strong one, as this exhibit of Wm. Clark & Co. shows. The amount of bending and hammering that these hoops will stand without breaking is remarkable, and shows that the reputation these gentlemen have gained is fully justified by the samples they exhibit.

CORYDON WINCH

has a display of railroad and other spikes at T 66, Main Building. His works are on Canal street, Philadelphia, and turn out on an average 20 tons of spikes daily.

THE PHILADELPHIA AND READING RAILROAD exhibit in the Main Building a very interesting series of ores and fluxes, and from their rolling mill piles, blooms and rails manufactured from the same, as well as some solid steel rails rolled in their mill from Siemens-Martin steel furnished by the Midvale Steel Works, and some steel-headed rails made under the patent of Mr. W. E. C. Cox, the superintendent of their rolling mill. Some of the old iron rails exhibited show conclusively that iron rails well made have a life far in excess of that generally allotted to them. One rail, 64 lbs. to the yard, was placed in track June, 1870, and removed April, 1876, carrying in that time 56,300,000 tons. Another rail of same section, and having endured the same traffic, is shown twisted cold. The analysis of this rail is as follows:

Phosphorus.....	0.422
Sulphur.....	0.032
Silica.....	0.392
Manganese.....	0.164
Carbon.....	0.027
Iron.....	98.963

The Philadelphia and Reading Railroad Company's Rolling Mill, at Reading, Pa., was built in 1867. The first rail was rolled in March, 1868, and the product since that time to June 1, 1876, has been iron and steel rails, and splice plates, the capacity being 20,000 tons per annum, and the average yield 17,000 tons. The building is 90 feet span, 30 feet to the square. The main building is 420 feet long, to which are attached two wings, one 180 feet, the other 90 feet long. The works consist of 12 single puddling furnaces, with one plain cylinder boiler 36 inches by 30 inches over each; 8 heating and 2 reheating furnaces, with two plain cylinder boilers 36 inches by 30 inches over each; one supplementary locomotive boiler; three vertical engines, with 40 inch by 40 inch cylinder, and fly-wheels 30 inches in diameter, weighing 70,000 pounds each, driving the 23 inch roll trains; one puddle train of rolls, two sets, three-high, 23 inch diameter rolls, to which is attached a rotary squeezer; one train, three sets, three-high, 23 inch diameter rolls; one set for breaking down old rails and puddled bar, one set for covers or head bars, and one set for blooming the rail pile; one train, one set, two-high (with arrangement for three-high), 23 inch diameter rolls, for finishing the rails; one train, one set, three-high, 12 inch rolls, for rolling crop ends of rails, splice plates, &c.; one horizontal engine, 24 inch by 30 inch cylinder, for driving the 12 inch rolls, two blast fans, two circular saws, friction rollers, rail elevator, straightening machine, two punching machines, rail drill, and hot shears; one steam old rail shears; two steam hot shears. Injectors are used for feeding boilers with water. In close proximity to the mill is a building 60 feet by 100 feet, containing a carpenter and pattern shop, blacksmith shop and machine shop; in the latter is an engine with cylinder 10 inches by 24 inches driven by spare steam taken from the mill boilers. This engine drives a roll turning lathe, two lathes, drill, planer and fan. In the rolling mill the heating of the iron is done with anthracite coal; the puddling with anthracite coal or a mixture of anthracite coal dust and bituminous coal.

HORACE A. BEALE & CO.,

of the Parkersburg (Pa.) Forge and Plate Mill, exhibit samples of their specialties of plate and tube iron, which they state are not made from special stock simply for exhibition, but are of the same material as they use in their everyday operations. Their specialty is tube iron, for which they claim an equality with any made. Samples are shown bent cold, without annealing, which certainly testify to a high grade of excellence. They also manufacture a grade of

common iron which seems a very superior article. Sample sheets bent both hot and cold are shown, one 84x42x1/4, bent with the grain into a small tablet. The muck or puddle bars shown are of a superior grade. This firm also show a patent hollow bottom for boiling or puddling furnaces, for which they claim a great advantage, both in saving ore and bottom, as well as in improving the grade of the puddled iron. They are using it in working strong irons, and state that they have to make bottom only once in from 60 to 100 heats.

MESSES. MOOREHEAD & CO.,

of Pittsburgh, Pa., who divide with a Philadelphia house the credit of being the largest galvanizers of sheet iron in the country, make a very tasty display of common C. H. and Juniata black and galvanized sheet iron, both in the sheet and worked up into cornices, shovels, stamped ware, and roofing and ceiling iron. The display is in the form of an arch, the base, facade, cornice, &c., being of galvanized iron, and the balance of black sheet. The top is beautifully ornamented with cornice work in various designs made from their galvanized sheet, and the whole is surmounted with a large spread eagle, gilt, also stamped from their iron. The roof of the arch is utilized to show the roofing and ceiling iron, and the corners to display it bent into pipes and tubes. This firm make a specialty of sheet, plate and tank iron, making no bar iron. Their sheet iron has the merit of being perfectly uniform in quality, and stands high in favor with the trade. Their galvanized iron is the standard for comparison, both in quality and finish, while their black sheet, shovel and stamping irons rank equal to any in the market. Beside the ordinary sizes of sheet displayed, there are two sheets worthy of notice on account of their extra large size, one of black iron, No. 24x48x14 inches, and one of galvanized iron, No. 24x48x120 inches, being the largest sheets of that gauge manufactured by any mill. They also show a piece of tank iron 10x54x216. Though no samples are shown this firm have facilities for the manufacture of armor plate, and have furnished it 12 inches thick by 5 feet wide and 12 1/2 feet long.

THE DANVILLE IRON CO.,

Danville, Pa., exhibit, in connection with the display of irons of which C. W. & H. W. Middleton are the agents, some samples of railroad iron. This firm make rails exclusively, and their mill has a capacity of 12,000 tons per annum.

The exhibit of

THE McCULLOUGH IRON CO.,

of Philadelphia, is in the Main Building (the exact location being column P, No. 70), and is a fine display of the ordinary and special varieties of their well known products. They present for examination samples of best galvanized "Chetwynd" galvanized iron, headed roofing plates, best bloom and best refined sheet iron (Harvey's patent cleaned) as also a polished iron for stamping purposes. The iron to be galvanized is manufactured at the mills of the company in Cecil county, Maryland, where they own and operate an extensive forge of 18 fires, using an immense quantity of charcoal in the refining process. The blooms produced are all consumed in supplying the bar which eight pairs of sheet rolls (30x40) work up into sheets. These rolls are placed in four separate mills; four trains at Octoraro Mill, on the Octoraro Creek, at Rowlandsville; two at West Annewell Mill, near Elkton; and one pair each in Northeast and Stony Chase. The number of men employed in all their works is about 500. The finished sheets from these mills are sent to the galvanizing works of the company, at Sixteenth street and Washington avenue, Philadelphia, where they are galvanized, and thence shipped to all parts of the country. This company was the first in the United States to galvanize sheet iron, having begun the business in 1852, importing skilled workmen from England; and such has been the unusual care, intelligence and skill displayed in manufacturing their iron, that they maintain a well deserved reputation for producing an article of uniform and unsurpassed excellence. Their best refined iron is manufactured at Wilmington, Del., where they have recently put into operation a large new rolling mill called the "Minqua" Works. Being fitted up with all the modern conveniences, and containing 3 trains of 24x44 sheet rolls, they turn out at this mill a superior quality of the well known Harvey patent cleaned sheet iron. We notice that the McCullough Iron Company style themselves successors to the Principio Company, of England, which was established at North East, Md., about 1720, as they own portions of the same land which the Principio Company owned, and the forge at North East is located on the same spot where the old forge once stood. The latter company was the first to erect iron works in Maryland, and grew to be an extensive concern, having forges and furnaces in Cecil and Baltimore counties, Maryland, and a furnace in Virginia. Great interest attaches "in this Centennial year" to this old company from the fact that two of its members were Augustine and Lawrence Washington, the father and brother of George Washington, and it was on the elder Washington's land in Virginia, along the Potomac, that the furnace of the Principio Company was built. A number of the books and letters of the old company are still preserved, containing many interesting items not only in reference to the Washingtons, but also to the state of the iron industry in those early times. The surplus bar and pig iron produced by the Principio Company, after the wants of the Colonists were supplied, were sent to England, and as a historical relic may be mentioned a bill of lading for "22 tons of pig iron," shipped to London in 1748, the imprint on the bill itself stating that it was "printed by B. Franklin, over the post office near the market."

The display of

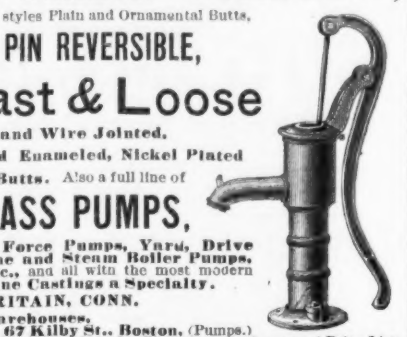
W. D. WOOD & CO.,

Pittsburgh, at T 61, Main Building, is not only attractive as a display, but it is a trophy of American ingenuity and pluck, conquering success in spite of the most decided obstacles. The exhibit is of Wood's patent planished sheet iron. Through the middle of the space extends a representation of a locomotive boiler made of their iron, crowned with a U shaped corrugated pipe, with a display of pans and various articles made from the iron. In one corner of the space a machine is at work making the corrugated elbow, and the whole is surmounted with a fence of unique design, all of which, post, balustrades, rails, etc., are made of this planished sheet. But it is not so much the way it is exhibited as the iron itself that we wish to speak, and in spite of the prejudice that has grown up in favor of the imported Russia sheet iron, we have no hesitation in saying that it is fully equal to the best Russia iron ever brought to this country. In appearance it is far superior, as a comparison of the locomotive boilers in Machinery Hall will very soon show. Its use is driving the imported iron out of the market. During the past two years 25,000 packs have been manufactured and sold. The principal railroads in the country use it exclusively on their locomotives. The jackets of the air pumps of the Westinghouse are all made of this iron, displacing the Russia. N. & G. Taylor, of Philadelphia, large importers of metals, say of it: "The American planished iron is far, very far, superior, is more lasting, possesses a better finish, and can be made and sold much cheaper." We are aware that these statements may be received with a look of incredulity. Every year for the last fifty has produced an iron that equaled the Russia, but somehow we soon hear the last of it. True as this may have been, we are convinced from our own observation and the testimonials that we have seen, that Wood's patent planished is in every respect the equal of Russia and in finish superior. If anyone doubts this we advise them to send for one of their circulars, and if any reliance can be put in human testimony they will be convinced. This iron is made exclusively from the best hammered charcoal bloom iron, made in their own works, and is finished under a planishing hammer weighing about 3 tons, and striking 300 blows per minute with an estimated force of about 20 tons to each stroke. The planishing process imparts to it that beautiful gloss and dappled appearance of the celebrated Russian sheet iron, and closes the pores of the iron so effectually that it will resist the action of the atmosphere fully as long.

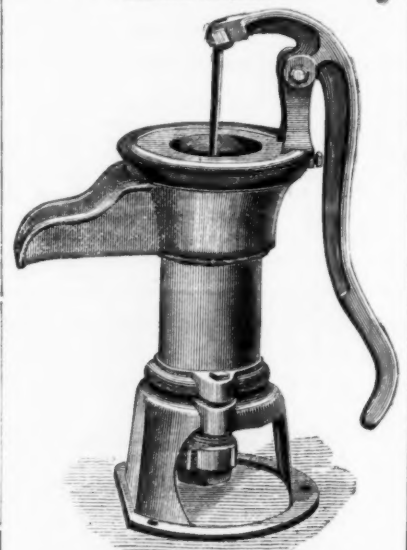
**Brazil and its Products.**—The *Paper Trade Journal* has taken pains to collect some very interesting items relating to the productions of Brazil, which will in the future be a source of vast wealth to that country. All intelligent travelers who have visited Brazil speak in the most glowing terms of the country. Professor Agassiz regarded it as the most productive and interesting country on the globe, and the one in which it is the easiest to obtain a livelihood. Some who have sailed up the Amazon declare that a vessel can be loaded with Brazil nuts at an expense of only a few cents per bushel. These constitute a valuable article of commerce, while the oil extracted from them is very desirable. All the tropical fruits are produced in Brazil almost without cultivation. The soil in many parts of the country will produce 20 successive crops of cotton, tobacco, or sugar cane, without the application of manure. No country in the world approaches the land of Dom Pedro in the variety of its forest productions. Professor Agassiz states that he saw 117 different kinds of valuable woods that were cut from a piece of land not half a mile square. They represented almost every variety of color, and many of them were capable of receiving a high polish. One tree furnishes wax that is used for candles; another a pith that is used for food; and still another yields a juice which is used in the place of intoxicating liquor. There is a single variety of palm from which the natives obtain food, drink, clothing, bedding, cordage, fishing tackle, medicine, and the material they manufacture into dwellings, weapons, harpoons and musical instruments. Doubtless the day is not far distant when the valuable woods of Brazil will be used for various useful and ornamental purposes.

The *Railroad Review* has, in a recent issue, some very interesting items concerning quick runs made last month on some of the Western roads. Remarkably fast time was made by a train on the Canada Southern Railway, from Amherstburg to Buffalo, August 21. The distance, 229 miles, was made in four hours and fifty minutes. This time included fifteen stops, one of which was fifteen minutes at St. Thomas for supper, and two for wood and water. The first 112 miles, from Amherstburg to St. Thomas, was made in two hours and ten minutes, including two stops. Deducting time consumed by stops, the actual running time for the entire distance was at the rate of sixty miles per hour. This is probably the fastest time ever made in this country for a run of such length, and the performance is worthy of record. A fast run was made Aug. 13 on the Toledo, Wabash and Western Railway, from Fort Wayne to Toledo. The average speed was nearly forty-five miles an hour, including stops, or 47.1 excluding them. The fastest time between stations was 19.2 miles at the rate of sixty-five miles per hour. The train consisted of one baggage car, one 8 wheel coach, one 12 wheel, and a 12 wheel Pullman sleeper.

The Pacific Mail Steamship Company's steamer City of Peking made the remarkable passage from Yokohama to San Francisco—a distance of 5000 miles—in 15 days, arriving at the latter port Sept. 1. This is a daily average of 337 miles, or 14 miles per hour, and brings Liverpool, via the Pacific Railroad and North Atlantic steamers, within 30 days of China.



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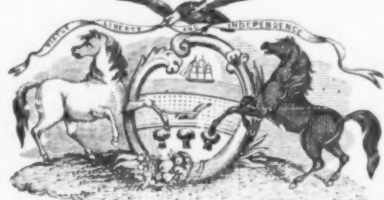
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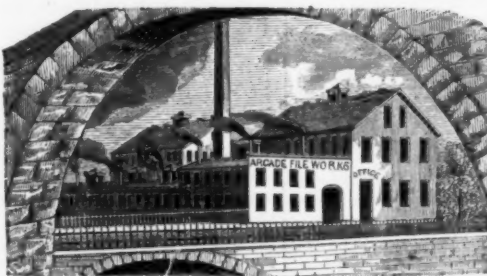


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READY FOR DRIVING.  
Manufactured from the best of NORWAY Iron,  
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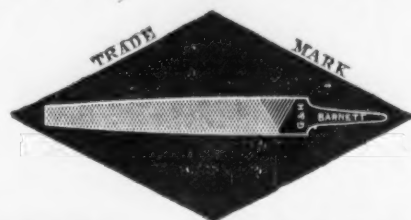
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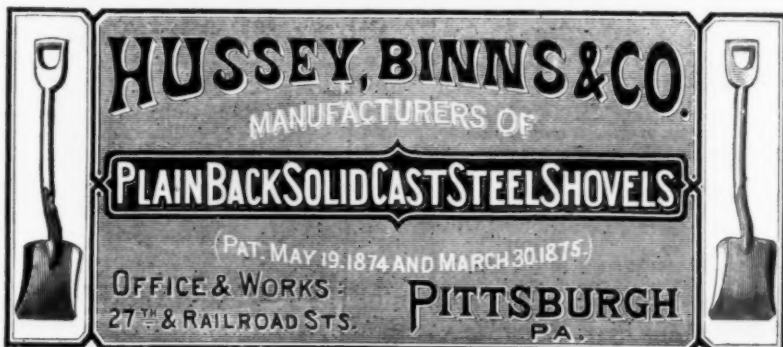
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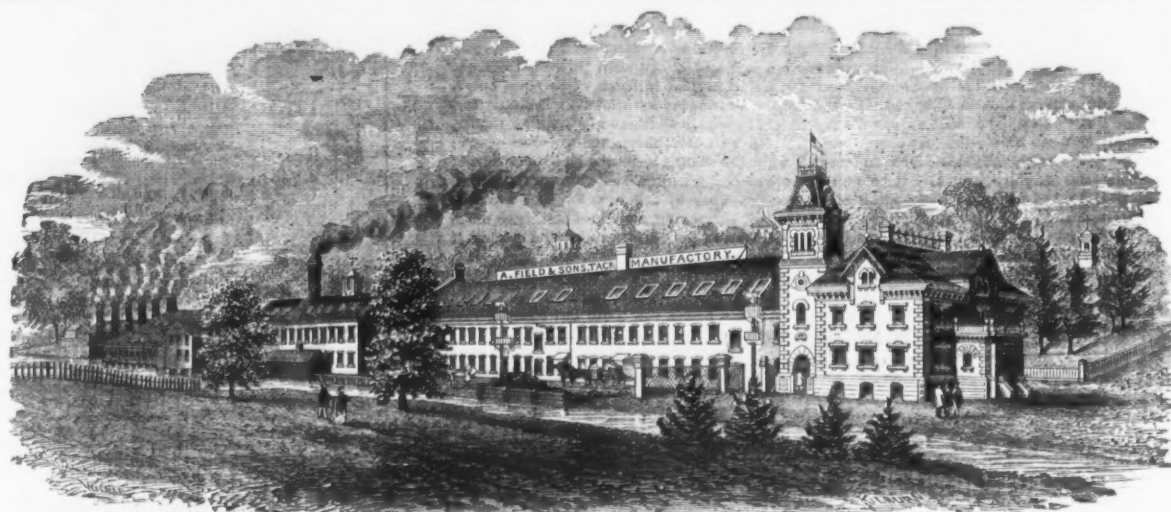


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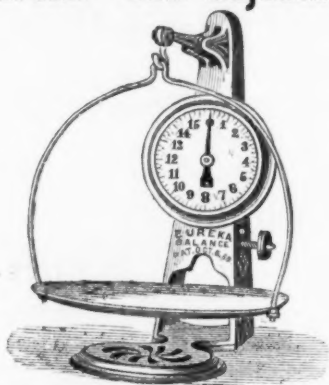
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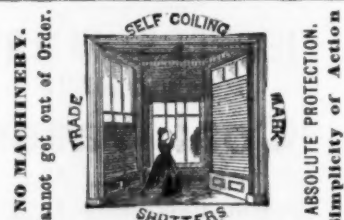


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Have a patented attachment for ascertaining the *tare* of a dish or other receptacle used in weighing without the use of *weights* or loss of time.

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I sell my Carriage Ornaments to dealers only.

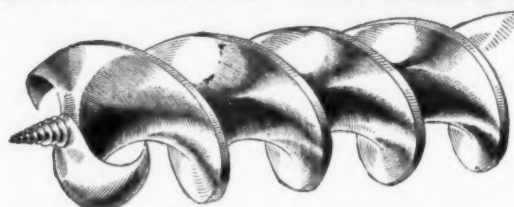
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Our New Catalogue, issued July 1st, will be furnished upon application.



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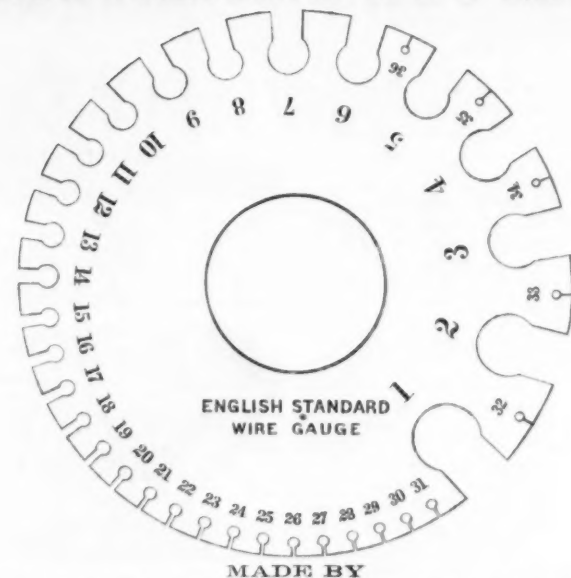
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Large Size, superior to stone or brick. Can be used with bellows or fan. Send for prices and further information to

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ENGLISH STANDARD  
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Manufacturers of

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### HORSE AND MULE SHOES.

### Steam-power for Street Railroads.

For some time past a steam car, or as it is sometimes called, dummy, has been running on Market street, in Philadelphia. It has attracted considerable attention and general approval. It is known as the "Baldwin" car, and was built last November in the Baldwin Works, Philadelphia. The car is owned by the firm, and was first run last fall on the West End Railway. It was then taken to Brooklyn, and was used there during the winter. The car is of the ordinary size, 16 feet long. The two cylinders, each 6 inches in diameter, with a 10 inch stroke, are beneath the car. The upright boiler stands as if in the door of the ordinary horse car, half within and half outside. The valves and levers are in front, the upward platform not being unlike those usually seen on the cars now in use. The inner half of the boiler projecting into the car occupies little room, is covered with attractive mirrors, and by the unobserving might be regarded as an ornamental feature of the car. To be shut off from the clatter of horses and the shouts of the driver is a decided advantage in street-car travel. The much feared smoke nuisance is entirely avoided by the use of anthracite coal, and the noise which usually proceeds from a locomotive is prevented by a noiseless exhaust, an original device perfected in the Baldwin Works. The much dreaded noise, which it was supposed would frighten women, children and horses, has been shown to be a chimera, and, in response to numerous requests from those living on the line of the road, the steam car has been provided with bells to warn people from the track. The temperature, too, can be greatly improved in cold weather with the heat of the boiler.

The Philadelphia Times says: The average cost of the horse car now used in that city is \$1100. Eight horses a day are required for each car, which have a combined value of \$1080; four sets of harness cost \$80, making the entire cost of car and equipment \$2260. The steam cars ready for use can be built for about \$2800. The horse cars last, on an average, about ten years; the propelling machinery of the steam cars will last as long, and probably longer, and when it is known that the average life of the horses used in the street railway service is only three years, it is seen that, as regards first cost, the steam cars have a decided advantage.

The car now running in Market street consumes about 500 pounds of anthracite coal a day, worth \$1.65; the daily expense of feeding and care of eight horses in the stables of the West Philadelphia Railroad Company is \$4.40, or a yearly difference in favor of each steam car of \$1003.75. No account is here taken of the cost of stables, cars, etc. The number of men required for running the steam car is the same as for the horse car—a conductor and driver. The superintendent of the Baldwin Works says that the car now in use in Market street has been run without difficulty 30 miles an hour. The president of the West Philadelphia Railway Company is much pleased with the results of the experiment. The Baldwin steam car is attracting considerable attention in other cities, and one of them has been ordered by the Citizens' Passenger Railway, of Baltimore. Some gentlemen from Cuba have a steam motor constructed on the same principles, to be used in drawing passenger cars in the streets of Havana.

### Dry Dock at Philadelphia.

From the Journal of the Franklin Institute we take the following particulars in regard to the dry dock of Messrs. William Cramp & Sons:

For many years the commerce of Philadelphia has felt the great want of proper facilities for docking large vessels for repairs, there being no private docks except two small floating ones, quite too small to accommodate vessels engaged in our foreign trade. The floating dock at the old navy yard was sometimes allowed to be used for merchant vessels, but the formalities and uncertainties attending its use, the remoteness from shipyards and shops, made its use expensive and unsatisfactory. To meet this want Messrs. Wm. Cramp & Sons determined to construct at their shipyard a dry dock of sufficient size to take in the largest vessels that enter this port. The water of the river being fresh it was determined to construct it entirely of wood.

The dimensions are as follows: Length from head to gate, when in position, 430 feet; length of keel blocks, 430 feet; width at bottom amidships, 45 feet; width at top amidships, 111 feet; width at gate, 70 feet; depth, 26 feet; depth below high tide, 23 feet. The foundation was formed by driving 12 inch iron shod oak piles about 10 feet into the disintegrated gneiss rock which underlies the locality. To the top of the piles are fastened 12 inch timbers running across the width, and on these is laid the floor of 8 inch plank. To form the sloping sides, piles were driven perpendicularly, in rows corresponding to those in the bottom, and cut off to a line conforming to the proper inclination. On the top of the piles were secured timbers running longitudinally, and to these were framed and fastened other timbers running down the slope, and fastened at the foot to the bottom timbers. To these sloping timbers were fastened the planking of the sides, so placed as to form steps of about eight inches rise and the same tread. Several rows of sheet piling were driven across under the dock to prevent the water from the river finding its way underneath, and tending to float it. The gate is an iron boat of sufficient length and depth to fill the gateway. The keel, stem and stern post project evenly about six inches, and are made to fit in grooves in the bottom and sides of the gateway. These grooves are lined on their inner sides with rubber, so that when the pressure comes against the gate a water-tight joint is formed. The gate has tanks to be filled with water to sink it to its position, and is provided with pumps to exhaust them, and also valves

to admit water to the dock when it is to be filled. The dock is now in daily use and will prove to be a great advantage to the shipping interests of the city.

### American Paper Car Wheels.

A correspondent of the Railway World, writing from Philadelphia, has obtained several interesting facts about paper car wheels. These wheels have been in use long enough to make a very remarkable record, but the very idea is a novel one to most people. The display of the company is found at Column E 65, associated with those of the numerous other car wheel companies, which together constitute the finest display of car wheels ever brought together. Specimens of paper wheels 30, 33 and 43 inches in diameter are shown, and one with a section cut out so as to show the interior structure. The wheel has a tire of steel with inside flange and cast iron hub. Cast iron or steel plates, 3-16ths of an inch thick, are bolted to each side of tire and hub, and the space between is filled with a homogeneous solid mass of compressed paper. The weight is transmitted from the hub to the tire solely through this elastic center. This is secured by leaving a small annular space between the circumference of the side plates and the inner side of the tire, and by elongating the bolt holes through the web of the tire. In case of fracture of the tire an inside flange holds it to the body of the wheel.

The paper is made of straw boards 1/2 inch thick, pasted together with rye flour paste, and made into sections 1/2 inch thick. They are then subjected to a 400 ton pressure for about five hours and then dried with hot air. These sections are then pasted together to the requisite thickness of about 3 1/2 inches, and again pressed and dried, forming a disk, which is turned off, and the tire is then forced on with a pressure of about 150 tons.

The writer says in conclusion: "It is claimed for these wheels that they are absolutely safe. The paper does not disintegrate like iron or steel; the bolts do not loosen as in wood, and the whole mode of construction and the materials used, render any dangerous breakage well-nigh impossible. These wheels are very elastic, cushioning blows and being easy upon rolling stock and track. They are economical. Some are in use which have run 386,400 miles with only slight wear of tire. One, which is in good condition, although it has run 312,900 miles under a Pullman car without the tire being turned, is exhibited."

We have a word to say in regard to these claims, which the correspondent does not seem inclined to fully endorse. So far as anything in the mechanical line can be, these wheels are absolutely safe, for if the tire bursts the wheel has a solid tread with two flanges on each side to hold it in place. The other points we fully endorse, having carefully watched the progress of the invention since the time when the first wheels were put under a car on the Vermont Central. Their record has been admirable. The tire has a much longer life than on a solid or uncushioned wheel, hence such enormous mileages as those mentioned above, made, too, without turning off. In a conversation with Mr. Pullman, some months since, he expressed the greatest satisfaction in their working. For heavy cars a cushioned wheel has become a necessity. These wheels are made by the American Paper Car Wheel Manufacturing Company, Hudson, N. Y., and are having a considerable sale in Europe. For large wheels such as are commonly used abroad, say from 40 to 43 inches, the paper wheel is admirably adapted.

**Physiological Effect on Condensed Air.**—The Engineer says: M. Bert, of Milan, has for a long time been conducting a series of experiments with a view of determining what are the physiological effects of condensed air on the human system. Many engineering works of the day involve the necessity of workmen carrying on their operations under various pressures of air, to say nothing of the fact that the rise and fall of the barometer involve us all in changes differing only in degree from that which the diver experiences when he descends from the surface of the water to a depth of fifteen or twenty fathoms beneath it. M. Bert thinks that the influences of ordinary changes of air as indicated by the barometer are due exclusively to the varying quantities of oxygen contained in the air inhaled. The pressure of oxygen and the consequent amount of it which finds its way into the blood, he shows, depends upon the centesimal proportion of it in the air and upon the barometrical pressure; and he says that the mischief which operates in air-tight dresses so often experience from the density of the air they are compelled to breathe might be completely obviated if an atmosphere were composed of air and nitrogen nicely adjusted in proportion to the pressure under which the mixture was passed along the tubes. Although it has been stated on good authority that a man may follow vocations involving the breathing of condensed air in certain cases not only without injury but even with advantage, there are also many cases in which injury is believed to result, and M. Bert's experiments may prove to be of great benefit to them.

**Monster Armstrong for Italy.**—The 100 ton gun manufactured by Sir William Armstrong for the Italian government will be proved at Spezia. Instead of being fired from a sleigh or carriage, it will be mounted on a pontoon raft and fired afloat. Sir William Armstrong has guaranteed that the gun shall yield an energy of 25,000 foot tons, which, with the 2000 lb. shot which is to be employed, will necessitate a velocity of only 1343 feet per second. The 81 ton gun has with a lighter projectile accomplished a velocity nearly equal to 27,000 foot tons, and if the 100 ton gun is prepared to endure corresponding charges and equivalent pressures, it should give results in increased proportion.



**Trial of the Improved Lightning Saw.**

THE EMPEROR, DON PEDRO, accompanied by Director-General Goshorn, Superintendent Albert and others, visited Machinery Hall, at the Centennial, on the evening of June 28th. Among other things inspected, at the invitation of E. M. Boynton, of New York, they witnessed a trial of the new Lightning Saw, patented March 28, 1876. Two men with one of these saws cut off a sound log of gum wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corlies, Morell, Lynch and other members of the commission witnessed the trial and the cutting. The Emperor remarked that was fast, very fast cutting. Last evening the Emperor made another examination of the saw. Philadelphia Press, June 30.

Boynton's saws were effectually tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log 11 inches in diameter was sawed off, with a four and a half foot Lightning cross saw, by two men, in precisely six seconds, as timed by the chairman of the Centennial judges of class 15. The speed is unprecedented, and would cut a cord of wood in four minutes. The Representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries were present, and expressed their high appreciation.

Any Dealer is aware that in an ordinary Hand Saw, the front cut is the effective cut, and drawing back the saw has little effect by reason of the slant edges riding over the fibre, as the Saw is drawn back. The difference between the front cut of a Hand Saw, and the back cut, is the difference between the Lightning Saw teeth and all others; for all other saws are set one point and ride on slant edges. By setting two points of the M the same side and the next two the other, I conceal the slant between them, and operate wholly by the outside of a nearly vertical M tooth. Standing nearly vertical the two points of the M occupy the same space as the old V tooth. One point only is cutting and the other follows in the slit behind it to cut in the same manner, in the return motion, thus doubling the cut upon the same base and space of tooth. This construction also gives the breadth and durability of nearly an inch of steel instead of a single slender scraping point, and presents the upright instead of the slant edges to the timber. Any one can in a moment test the principle by comparing the front and back cut of any V tooth Hand Saw. My new patent of March 28th, 1876, allows the saw-dust perfect clearance; the arch slightly widening to the points of teeth renders it impossible for green or resinous saw-dust to be retained, while the slightly increased breadth at base of tooth gives the durability so much advocated by parties who have round-edged files for sale. Slightly pyramidal, the outer edges are as upright as the front cut of a Hand Saw, and the back slant cut is concealed in no other Saw than mine, by setting the two points of M to cut in line instead of alternately. Thus by this new Patent I avoid all "overhang or under-cut," avoid all tearing, and to the matchless speed of the Lightning dress and set, add the durability, simplicity of sharpening, and sweet cutting so much admired. I thus adapt the Lightning teeth to universal use, in all Hand, Pruning, Buck, and Cross-Cut Saws. The concave in the centre of the M saves files, and renders it impossible to file the tooth out of shape. A 10-inch Cant File and Set fitting the M is furnished for forty cents, that will file ten saws easily.

A 16-inch log was sawed off in 17 seconds by hand with a Lightning Cross-Cut Saw, at Pennsylvania State Fair, on September 30th, 1874, before President Eby; W. B. Lawson, S. S. Hoagland, and other officers of the State Board, timing. \$1000 challenge to any responsible saw manufacturer, to match the Lightning saws in speed of cutting and ease of sharpening. This patent saw tooth has recently been vindicated by U. S. Court decreeing costs and damages for infringements. Beware!

POOR GOODS ARE NEVER IMITATED.

CENTENNIAL SAW

PATENT LIGHTNING SAW

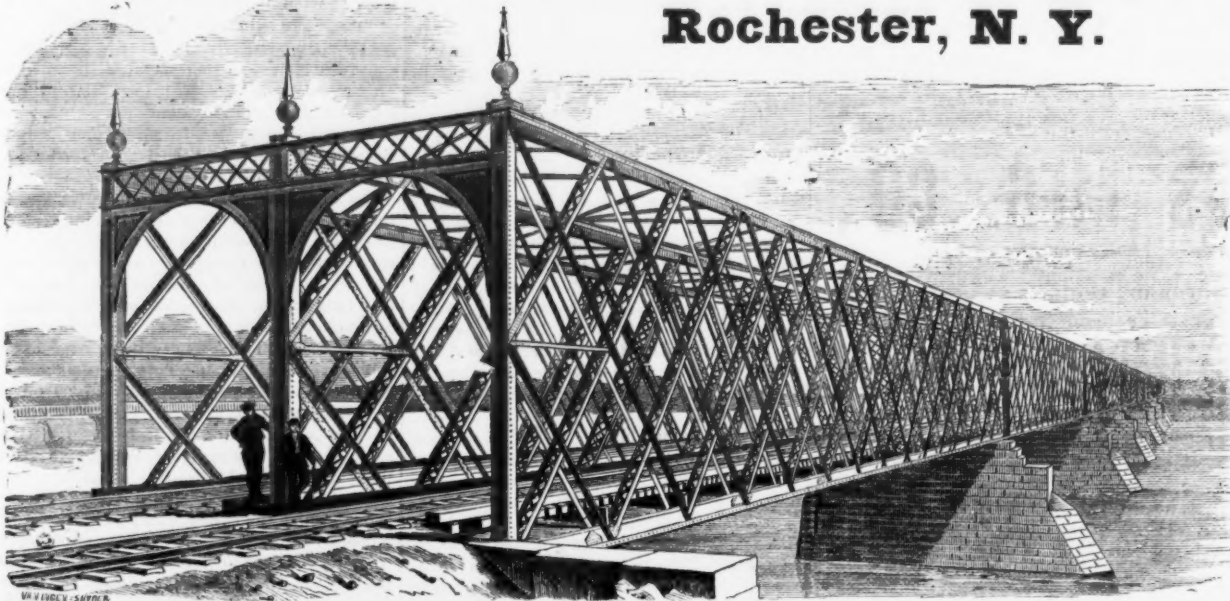
PAT. MARCH 28<sup>th</sup> 1876

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DOUBLE EDGED PRUNING SAW.

PHILADELPHIA OFFICE,  
Near Corlies Engine, Machinery Building, Centennial.

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Wrought Iron Riveted  
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[Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge and Iron Works.]

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Established 1843. Manufacturers of FIRST QUALITY

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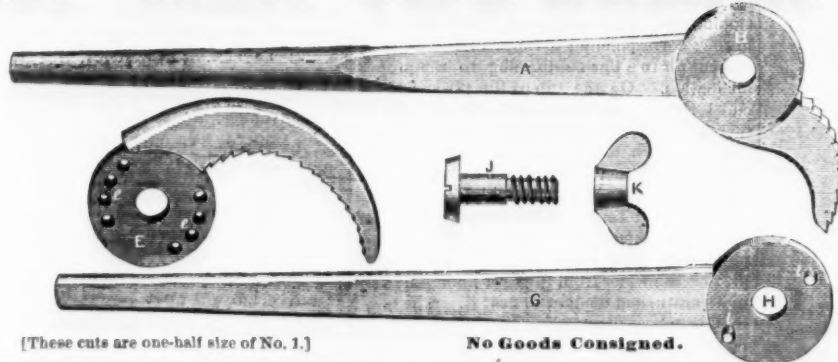
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HOG RINGER  
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The only ring that  
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Ringers 75c. Rings 50c 100. Holders 75c. Huskers 25c.

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CORN HUSKER  
Is the best Husker in  
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HOG AND PIG  
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No sharp points in  
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FORGED SOLID FROM THE BAR.

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which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory, and in New York by Messrs. J. Clark Wilson &amp; Co., No. 81 Beekman Street (who have a full stock of all patterns always on hand), and also by Messrs. G. B. Walbridge &amp; Co., No. 99 Chambers Street.

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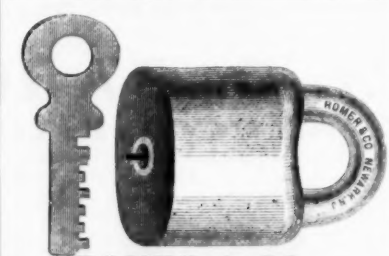
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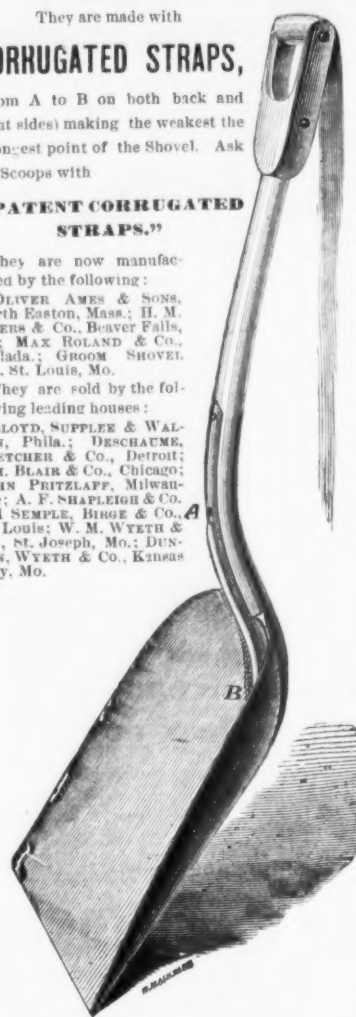
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Speaking Tube, Elbows and Mouthpieces, Send for new Trade List.

SPEAKING TUBES FITTED UP.

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NEW YORK.

## International Exhibition at Cape Town.

On the 1st of February, 1877, an international exhibition is to open at Cape Town, Cape of Good Hope, which is of special interest to our hardware and other manufacturers, by reason of the favor with which our goods have met of late years in the Colony, and the extremely low duties there levied. Many of our goods are admitted duty free. A few notes relating to the flourishing Cape Colony may, therefore, be of interest to our readers.

The Colony was originally founded by the Dutch, under Van Riebeck, about the year 1652, the Portuguese having before made an attempt at a settlement. It was at first but a very small patch of ground between the Liesbeck River and Table Mountain; but when it was taken by the English, in 1795, it had extended to the Great Fish River, and north along the great mountain range of the Roggeveld to the Sneeuwberg and Bamboesberg. In 1803, at the peace of Amiens, it was given up by the English, who occupied it again in 1806. Since that time the boundary has been extended north to the Orange River, and east to the Great Kei and Indwe, an area of about 350,000 square miles. The settled portion of the Colony is estimated at 190,950 square miles, the population being 721,502. During the last decennial period it had increased 24 per cent., while Great Britain had gained 13 per cent; Victoria, 35; South Australia, 46; New South Wales, 44; Western Australia, 59; Tasmania, 10; and Nova Scotia, which presents the highest rate in the Dominion of Canada, 17 per cent. The Colony, therefore, presents a fair amount of increase.

The amount of goods imported in 1874 was £5,558,215, while there were exported in the same year £4,138,838. The preceding year the imports were £5,130,065; the exports, £3,761,310. There was, consequently, an increased trade movement of £805,678, or about \$4,000,000, gold, which, in a population of but 721,502 inhabitants, is a great deal. Among the imports in 1874 there were:

Agricultural implements.....	£38,174
Gunpowder.....	48,054
Guns.....	33,771
Hardware and cutlery.....	£333,135
Bar iron, bolts and rods.....	50,803
Lumber.....	1,131,271

The aggregate amount of goods actually delivered to consumption being £5,424,273. The above shows that the Colony took about \$2,000,000 worth of hardware and iron, which is a large amount considering the limited population. The principal exports in 1874 were:

Copper ore.....	13,646
Ostrich feathers.....	38,829
Angora hair.....	1,036,570
Hides.....	18,458
Horns.....	134,154
Ivory.....	73,747
Goat and sheep skins.....	2,941,128
Wool.....	42,420,481

Reducing the amount exported to dollars gold, it will be seen that there left the country \$28, gold, to the person, or about one-third the amount of Australasian exports, which goes to show that Australia and New Zealand are much greater producers. But it should be remarked that in the Australian exports gold is included, while the bulk of Cape diamonds which leave the country is not declared at the custom houses. If the precise amount of diamonds exported could be ascertained, the Cape would compare more favorably with its sister colonies in the Pacific. But however this may be, we have shown that the mastery of the Cape hardware market is well worth striving for, the duty being but 10 per cent.

The tonnage cleared inward and outward in the principal wool port, Port Elizabeth, will better than anything else show the rapid development of commerce in the colony:

Port Elizabeth Shipping.		
	Inward.	Outward.
	Tons.	Tons.
1869.....	94,627	91,874
1870.....	110,271	106,289
1871.....	110,271	106,289
1872.....	150,729	150,462
1873.....	156,776	151,045
1874.....	166,479	166,711

Few ports even in the United States and Australia can probably show an increase so rapid.

Cape of Good Hope Duties.

Coal, coal or patent fuel, the ton of 2000 pounds.....	9d
Gunpowder—per pound.....	6d
Blasting powder.....	10 5
Guns, or gun barrels—the barrel.....	21
Petroleum in packages not less than 1 gallon—per gallon.....	6d
Pistols or pistol barrels—each.....	10
Lumber not tongued and grooved—cubic foot.....	5
Agricultural implements—including plows, corn shellers, dam scrapers, kail hoes and picks, and wooden corn shovels—not spades.....	5
Cement.....	5
Machinery, not agricultural, adapted to be driven by horse, steam, water or wind-power.....	5
Slates for roofing.....	5
Tar, pitch and rosin.....	5
Hardware and cutlery.....	10 5

Duty Free.

Agricultural machinery (but not parts thereof) such as reaping, threshing and winnowing machines, anchors and chain cables, guano and other manures, metal composition and sheathing (but not nails, which pay 10 per cent.), ores of all kinds.

The preceding extract, which we have made from the Colonial Guide Book of 1876, shows that the duties, if we except guns and pistols, are ridiculously low, and open a field to our manufacturers of the most inviting kind.

Regular lines of packets leave for the Cape from our Atlantic ports constantly, there being always an abundance of outward freight, and seldom a lack of home cargo. It is, in fact, an old established trade, and there is nothing adventurous about it, the population of the colony being a highly civilized one, much like our own, and the climate about the same as that of California.

International exhibitions, it is true, are following each other in rather too rapid succession, but if our manufacturers have not shrunk from going all the way to Chili for exhibiting and introducing their goods, does not the Cape offer them equally as much attraction, being after all an Anglo-Saxon country of the most progressive kind.



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Wood Screws, Steel in Sheets,  
BAND SAWS. TOOLS FOR BRAZING, &c.  
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

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**PEACE & HOGAN,**

VULCAN TRADE MARK SAW WORKS.  
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**Patent Ground Saws,**

CIRCULARS, CROSS-CUTS, MILL, MULAY, GANG, HAND, & BUTCHER.  
Molding and Planing Knives, Plastering Trowels, Mitering Rods, &c.

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OFFICE & WAREHOUSE, 59 Beekman Street, New York.

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ESTABLISHED 1857.

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GENUINE SILVER STEEL DIAMOND X CUT SAW.

\$1.50 Per Foot.



BEWARE OF THE IMITATION CALLED "DIAMOND TOOTH."

**Wheeler, Madden & Clemson****MFG. CO.,**

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Manufacturers of

**WARRANTED CAST STEEL****SAWS**

Of every description, including

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**WOOD SAWS. Etc., Etc.**

**AMERICAN SAW CO.,**

Manufacturers of

Movable Toothed Circular Saws,  
**PERFORATED CROSS-CUT SAWS**  
And SOLID SAWS of all kinds. Trenton, N. J.

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Manufacturers of Every Description of Patent Ground

**SAWS**

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**HAND-CUT FILES & RASPS.**

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**BEST REFINED SMOOTH FINISH SHEET IRON.**

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Carriage and Tire Bolts,

From the Best Brands  
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The Celebrated

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All Styles of

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All dealers in SPRINGS AND AXLES will find it to their interest to send to us for  
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One-sixteenth to five-eighths diameter.  
Heads and points to sample.

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**CARRIAGE BOLTS.**

Buy the Best.



Clark's Patent

Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and cannot  
turn in its place.

MANUFACTURED BY

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Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, etc.  
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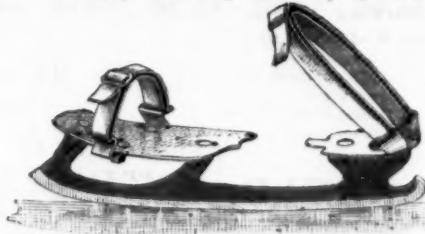
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OUR NEW BRONZE SKATE.



Clamps &amp; Straps

PRICE, WITH STRAPS COMPLETE, \$2'00.

Our SPRING SKATES are by far the easiest to the feet and ankles, and the most elegant in ap-  
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CAUTION.

The trade is cautioned not to buy any Skate made in infringement of our patents, issued to O. Edwards,  
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ware of cheap iron imitations of our popular ONE DOLLAR STEEL SKATES.

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The Cheapest and Best Gauge Cock made.

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Manufacture all kinds of

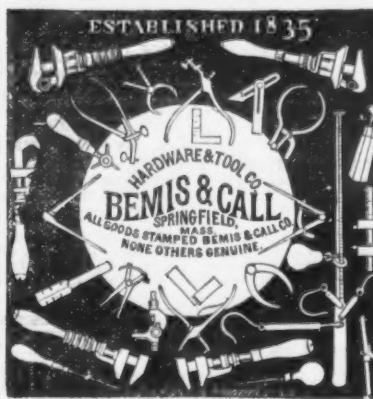
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And keep on hand a full

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Goods used by Plumber

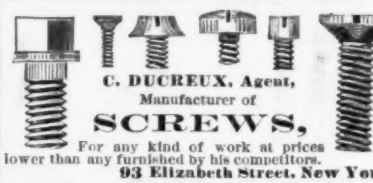
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ALL GOODS STAMPED BEMIS & CALL  
NONE OTHERS GENUINE



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Manufacturer of  
SCREWS,  
For any kind of work at prices  
lower than any furnished by his competitors.  
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**TURNED MACHINE SCREWS.**  
Case-Hardened Set, Cap and Gibb Screws, Hexagon,  
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**KEYSTONE SCREW CO.,**  
Manufacturers of  
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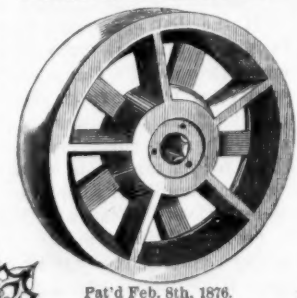
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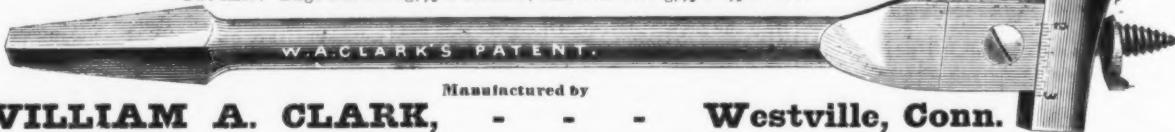
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Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other.  
Two sizes: Large Size Boring,  $\frac{1}{4}$  to 3 inches; Small Size Boring,  $\frac{1}{8}$  to  $1\frac{1}{2}$  inches.



WILLIAM A. CLARK,

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ESTABLISHED IN 1837.

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Consult your interest by sending for our prices before placing your Fall orders

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### COIL CHAIN.

We furnish

A Better Chain for Less Money  
Than any manufacturer in the country.

Quotations made exclusively to wholesale dealers and jobbers.

Union Chain & Cable Co.,  
Pittsburgh, Pa.

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D. R. SPERRY & CO.,  
Batavia, Ills.,

Manufacture Stove Hollow Ware, in finish, design and convenience the BEST made. Also make all sizes of Caldrons, Soap Makers' Kettles, Sugar Kettles, Drug Mortars, etc.

HOLSKE MACHINE CO.,  
279 Cherry St., near Jefferson St.  
ELEVATORS

For Hotels & Stores a specialty.  
Machinery in General made to order.

JAMES HARDMAN, JR.,  
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Presses & Dies, Jewelers' & Tinners' TOOLS, MADE AND REPAIRED.

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All kinds of General Machinery.  
PRICES THE LOWEST. Day-work, \$5 per day.

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LEWIS, OLIVER & PHILLIPS.  
ADAMANTINE FILE WORKS.  
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EMMET HAMMER CO.  
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### A Superior Quality of SCREW BOLTS,

Lag Screws, Tap Bolts,  
Set Screws, Bolt Ends, Turn Buckles,  
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SAMUEL HALL'S SON & CO.,  
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Single Twist Solid

SPUR BITS,

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both Single and Double

Twist.

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The Lewis Pat. Bits

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## Nuts, Bolts- Washers, Etc.,

IN EVERY VARIETY.

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TO

## UNION NUT COMPANY.

99 Chambers Street, New York,







and Australia would of necessity be curtailed, and the article would gradually rise without an effort; but we can perceive no diminished output as yet, and, until we see it, we can discern no sure sign of a lasting improvement.

How moderate the visible supply has been in former years the following monthly averages will show:

AVERAGE MONTHLY VISIBLE SUPPLY IN ENGLAND AND HOLLAND.

April 1, 1866, to April 1, 1867.	Tons.
1866, to 1867	12,213
1867, to 1868	11,371
1868, to 1869	9,407
1869, to 1870	8,563
1870, to 1871	8,947
1871, to 1872	7,034
1872, to 1873	6,565
1873, to 1874	9,136
1874, to 1875	11,341
1875, to 1876	13,619
Average, 9,750 tons.	

We are quite ready to admit that the American market is in a more favorable position than that of Europe, in view of the diminished supplies expected from Singapore, coupled with a moderate stock here, but any considerable enhancement in price would soon stimulate larger shipments this way from England.

### The Storm and the Water Famine.

On Sunday of the present week a storm of remarkable violence visited the city of New York. The damage done by it was very considerable, although this city suffered much less than many others. In spite of its fury and the destruction it caused, its visit may be looked upon as a blessing, for it virtually put an end to New York's water famine. For more than two weeks the supply of Croton has been seriously diminished by order of the engineers in charge. Up to this time the consumption of water has been steadily on the increase for years, and during the present season reached the enormous figure of 105 gallons per inhabitant for 24 hours. Warnings and expostulations were alike in vain, and, as a last resource, the supply was reduced. Never before has there been any such drain upon the resources of our aqueduct and reservoirs as during the present, and never before, if we are correctly informed, have we had such a limited rainfall at the critical portion of the season. The water, unfortunately, has been wasted, and not used. The supply is abundant—large enough, in fact, for a city of the size of London, whose population is three times that of Manhattan Island, and, although with our climate we need more water than is necessary in England, yet more than a hundred gallons per day per head of population is excessive.

Waste goes on in all directions, apparently without the least effort on the part of the individual to prevent it. In saloons, hotels, factories, stores, and along the wharves, the quantity of water that runs to waste absolutely without purpose is distressing. If this were paid for it would be some consolation, but it is not. The very fact that Croton costs but a nominal sum seems to stimulate every one to waste just as much of it as is possible with the means at hand. Even in houses and offices it is no unusual thing to find a faucet running a steady stream night and day. The size of the stream is small, and it seems so insignificant that people do not think the matter worth attention. A stream of water no larger than a lead pencil, and running silently, will easily flow at the rate of 700 gallons in 24 hours. With a head of water equal to thirty feet, we have seen an ordinary basin cock deliver water at the rate of a gallon in three-quarters of a minute, or considerably more than 1400 gallons per day, a quantity of water more than sufficient for a family of twenty persons using all they would need for a day. Practically 60 gallons per day is more than an individual can use, except under extraordinary circumstances. The individual does not generally use a tithe of this personally; the quantity is only arrived at by averaging from the consumption of a family or a number of people. In the country, where the water for household use is taken from a well or cistern, the amount consumed per individual is probably very much less than this, and we think, from rough calculations that we have made, that the average consumption of water for a week by a family of three persons in a country town is about 11 gallons per head each day. Yet we find that in this city, as well as in Brooklyn, water has been wasted at the rate of 100 gallons per head. Paterson, New Jersey, has been having a water famine as well as New York, and one which has probably caused the people not only more anxiety but more trouble also. To that city, as well as many others, the recent rain will be a great relief in filling streams and supplying the reservoirs.

The lesson to be learned from the unfortunate experiences of this city and Brooklyn is a double one. First, it is impossible with any ordinary expenditure of money to supply as much water as a large city can waste. Second,

from the beginning people must not be allowed to waste with impunity. This may entail a great innovation in the manner of serving water or selling it, but it is necessary. What costs people nothing they are prone to value lightly and waste extravagantly. While we believe in giving an abundant supply of water at the cheapest possible rate, we think that waste should be paid for, and the price charged for it should be very high.

The *Labor Tribune* has but one cause to which it ascribes all the ills to which the body politic is heir, and that is the rates of interest paid; and but one aim, and that is usury laws. In commenting on our editorial of September 7th, on "Encouraging Indications of a Revival in Iron," it says: "The bolt works and Zug's resumed, because they were purchased at a depreciated price. The anthracite combination broke up, because it could not pay the high rates of interest. There would be but few commercial failures if the interest on money was low. These failures are chiefly due to paying high interest. No revival can come while the industries are subjected to such a tax. The manufacturers who suffer directly certainly know this, and they know a revival of business is impossible as long as this burden rests upon them. It is surprising that our commercial and manufacturing interests rest so quietly under the terrible load of taxation. As long as they can get the high interest out of consumers they run on, hoping for a change, which cannot come. The causes of the depression must be removed, and we ask the help of the employers of labor to bring about this end. The workingmen have made the start.

This is nonsense. If the bolt works and Zug's resumed, as it claims, only because they were purchased at a depreciated price, why has not Rogers & Burchfield's and Wharton's and Glass, Neely & Co.'s mills started up? They could all be purchased at a depreciated price, and if purchasing at a depreciated price is the magic wand that would set our idle mills in motion, we wonder that it has been overlooked for the past three years.

"The anthracite combination broke up because it could not pay the high rates of interest," is another lucid and overpowering statement of the reasons of this failure. Will they be in any better position to pay the interest they must pay with coal selling at a reduction of 40 per cent.? These reasons are simply absurd. While high rates of interest may have forced many men into bankruptcy, the trouble is back of this, and is lack of capital. It is because men have placed themselves in a position where they have been compelled to pay high interest, and if instead of ranting about reducing the rates, the *Labor Tribune* would denounce those who attempt to do business without adequate capital, it would be more sensible, but this is too much to expect.

By the way, it would be interesting to know why the *Labor Tribune*, in copying our article, omitted that portion showing the cost of fuel per ton of pig and merchant iron. Is it afraid of the truth?

### New Publications.

WOOD CONVERSION BY MACHINERY. By John Richards, M.E., author of "A Treatise on the Construction of Wood Working Machines," "The Operator's Handbook of Wood Working Machinery for Practical Workmen," "Workshop Manipulation." London, J. & W. Rider. 100 pages.

It is safe to say that anything that comes from the pen of Mr. Richards is not only worth reading but is also interesting. No writer upon mechanical subjects since the time of Zerah Colburn has had so complete a command of English, or been so happy in his descriptions as Mr. Richards. The little volume before us is no exception to the rule, being full of desirable information—information, too, expressed in the pleasantest manner. Some of the chapter heads are as follows: Economic effect of wood working machines; inventions of Sir Samuel Bentham pertaining to wood working machinery; patents on wood working machinery; factories foundations; arrangements of factories; saws and sawing; shaping wood, &c. These were originally a series of articles contributed to the *Timber Trades Journal*, and were largely historical and economic. They are full of hints and suggestions, and are well worth the study of any manufacturer, whether of wood or metal or other material, containing as they do so much that bears not only upon the subject in hand, but upon the general principles of manufacturing.

Artificial Ivory.—The patent taken out by B. S. Cohen, of London, thus describes the method of the manufacture of this article. Ivory dust is boiled with water to a jelly, and to this is added some shellac dissolved in alcohol, and some oxide of zinc. For every pound of ivory, 1 oz. each of shellac and zinc oxide is taken. The pulpy mass is poured into forms, allowed to become dry in the air, and then subjected to hydraulic pressure. The finished material may be cut, sawed and turned as well as natural ivory or bone.—*New Remedies*, v. 256.

### HARDWARE AT THE CENTENNIAL.

#### Main Building.

THE YALE LOCK MANUFACTURING CO.,

Stamford, Conn. The exhibit of this firm is in the Main Building, P 72, and is beyond doubt one of the finest and most practical displays in the whole Exhibition. The space occupied is 30x35 feet, and a leading feature of the display consists of a model post office, the interior fittings of which are solid walnut, the exterior white pine and walnut, and the boxes of solid bronze, handsomely figured. The exhibit is intended to illustrate the company's facilities for furnishing post office equipments, and anything more complete or convenient than the one shown it would be difficult to imagine. It is supposed to be of sufficient capacity to accommodate the postal requirements of a town of 15,000 to 18,000 inhabitants, and the arrangements, for sorting letters, delivery, etc., are so admirable that two persons could easily carry on the work of the whole office. The number of lock boxes is 545; call boxes, 600; alphabetical letter and paper cases, arranged with delivery wickets, joiner work, money order room, overhead sashes, etc., etc. Each lock is different, and no key will unlock any but the one it was made for. The postmaster is provided with a master key to unlock the drawers and cupboards in the post office proper. The display is complete to the minutest detail, illustrating every department of post office work, and cannot fail to be of interest to every intelligent visitor. The company also display a magnificent assortment of house furnishing and builders hardware in real bronze, comprising door, shutter, window and closet knobs; lever and store door handles, roses and escutcheons, bell pulls and levers; fast and loose joint butts, catches, bolts, sash fasteners and lifts; shutter bars, name plates, etc., etc. The designs of these goods, both as to form and ornamentation, are of the most beautiful character, while in the quality of the material, excellence of workmanship and elegance of finish they cannot be surpassed. They also display the same line of goods in verd antique, antique, gilt, illuminated, nickel-plated, nickel and black, nickel and gold and enamel. They also display a great variety of locks, known under the denomination of the "Yale" and "Standard." Both are equally well finished, and give the greatest possible security. The Yale time lock, however, appears to be a special attraction to many, and, although our readers may be familiar with its general character, a brief description may not be out of place. This lock when once set requires no further care except winding, and performs unaided all of its duties automatically. It can be wound without exposing the mechanism of the lock by means of the eyelets or ports in the glass face, through which the winding key is inserted, thus removing all danger of injury to the time movements by dust and dirt. It will not lock unless both movements are running, thus making it impossible to lock with one movement only. It can be set to lock, as well as unlock, at any given hour, and the hour for locking or unlocking can be changed in a few seconds. It can be set to remain locked from Saturday night to Monday morning, or to open during the daytime of Sunday, as may be desired. It has four separate and independent devices for unlocking, either of which will unlock it. It never can run down in the locked position; for, if through any carelessness in setting the lock, or through omission to wind it properly, the dials should be permitted to stop when in the locked position, the running down of either movement will open the lock. It is thus protected against any possible carelessness or inattention on the part of the user. It cannot be tampered with by unauthorized persons, for its door is fastened by a fine key lock, and need never be opened unless it is desired to change the hours of locking or unlocking. The clock mechanism is cushioned between springs, so that no jarring or sledging of the door can affect it. It has two separate independent and jeweled chronometer movements of the best construction. It is designed to be used in connection with other locks as an additional security, and can be applied to any vault or safe door where there is a vacant space of 7½ inches wide by 6 inches high, without making a hole through the door, or in any way changing or disturbing the other locks or bolt work. A very handsome show case contains a display of chronometers used in connection with the Yale time locks; these are made by Howard & Co., Boston, and are the perfection of fine workmanship. The company also make a splendid display of mortise, house and store door locks, dead locks, desk, drawer, chest and cupboard locks, sliding door locks, &c. These locks comprise an immense variety of styles and sizes for different purposes, yet they all embody the same essential principles of construction, the distinctive features being the formation of the parts acted upon by the key, and the shape and size of the key itself. The escutcheon or "tumbler case," containing the pins upon which the bits of the key operate, projects slightly from the case of the lock, the depth of the escutcheon regulating the length of the key, without regard to the thickness of the door. These peculiarities may be illustrated by the description of a Yale mortise night latch, the escutcheon of which is applicable to every variety of lock. The escutcheon consists of an exterior cylindrical shell, having in its lower part a smaller cylinder, above which is a metallic case containing the "pin chambers," and within these is the "plug," to the inner end of which is attached the cam that imparts motion to the bolt. In this plug is the keyhole. The escutcheon contains five holes or pin chambers, formed partly on the shell and partly in the plug. If the pins filled these holes the rotation of the plug would be prevented, but being cut in two it revolves freely, carrying with it the lower half of the

pins, and leaving the upper half in the shell. The upper part of the pin is called the "driver," the lower half the "pin," and above each driver is a spring which presses constantly downward. In this position the drivers intersect the joint between the shell and the plug, completely preventing the rotation of the latter. If, by the insertion of any slender instrument, the pins are raised to their utmost height, they will bar the movement of the plug as effectually as the drivers did, or if four of them were properly elevated the fifth would still hold the plug in check. To open the lock, therefore, all the pins must be raised simultaneously to just the proper height, which can be done only by the right key; a variation even of one-fiftieth part of an inch of the length of one pin will prevent the opening of the lock. This explains the immense variety of keys and almost limitless range of permutations of which the Yale locks are capable, and constitutes an element of security in greater degree than is possessed by any other locks now made. The width of the key permits ten different "bittings," or depth of notches, therefore a lock with but one pin could be variously "set up" so as to require ten different keys. With two pins the number of possible changes would be 100; three pins, 1000; four pins, 10,000; five pins, 100,000; six pins, 1,000,000; and seven pins, 10,000,000. The least number of pins in any of the Yale locks is four, as in drawer and desk locks; night latches have five; post office, store door locks, &c., six; safe-deposit locks, seven. All descriptions of keys are made from the best quality of English cold rolled steel, and are heavily nickel-plated. A careful record of all permutations is preserved in order to avoid the duplication of keys. Owing to their peculiar construction, it is claimed that the Yale locks admit of a wider application of master or "pass" keys than any other locks ever made. With two exceptions, any or all of the Yale pin locks may be arranged in one set, controlled either by the same key or a master key, hence a number of locks may each have its own special key, while a single master key will open them all. The Yale pin locks are also a prominent feature of the exhibit, and appear to entirely meet the purpose for which they are designed. It is not attached to the door, but built into the masonry of the cell wall, and is perfectly inaccessible from within the cell, the bolt projecting into the door jamb. The arrangement is such that the door may be swung to and spring locked, and afterward deadlocked by slightly turning the key. This lock has six pins, capable of many thousands of changes. The Yale rim cell locks are used upon cell and corridor doors, or where it is not possible to apply the jamb lock. They are made in several sizes and styles, to open from one or both sides, have very heavy iron cases and bronze bolts, and are constructed with a view to great strength and complete security. The Yale Lock Manufacturing Company have not only made their exhibit complete and practical, but have placed it in charge of a thoroughly competent agent, Mr. Suwerkop, who is posted in all the details of the business, and conversant with most of the European languages, thus enabling the company to avail themselves of every advantage offered by the influx of foreign visitors. This is a matter of the utmost importance, and one which, we regret to say, has been a serious omission on the part of many exhibitors. Such an opportunity as the present may not occur again in a lifetime, and it is poor economy to make a splendid display of goods and then leave them without some competent person in charge to explain their uses, advantages, values, etc.

### The Seaboard Pipe Line.

Active operations in connection with this enterprise have been steadily continued. On August 31 a party engaged in surveying the route arrived at Columbia, Pa., in the prosecution of their labors, and continued the survey toward Lancaster, Pa.

The *Columbia Spy*, of September 2, states, probably on the authority of these engineers, that "the route of the pipe line is from Brady's Bend, on the Allegheny River, across the Allegheny Mountains and over South Mountain to Gettysburg. The latter place is the distributing point through two main branches to Baltimore and Philadelphia. The Baltimore route has been surveyed, and the surveying parties are now working on the Philadelphia route."

The *Railway World* remarks that "Baltimore parties interested in the enterprise expressed the opinion last week that the work of laying pipe would be commenced on the 31st ult., and that the line could be completed in 90 days if no legal obstacles were interposed. There is great virtue in an 'if,' however, and the interests affected by the seaboard pipe line are so numerous and varied that the new company will probably be required to prove its possession of a very clear claim to the right of way before it can put its line in working order."

The *Catawqua Dispatch* gives the following details in regard to the line of the pipe: "The organization of the company recently perfected shows that nearly all the pipe companies in the oil region are amalgamating and co-operating in this enterprise, under the charter of the Pennsylvania Transportation Company. This company have a charter paramount to all others, and of much superior scope to the Free Pipe Bill. In fact, the Pennsylvania Transportation Company are empowered and have the exclusive right to lay a pipe anywhere within the limits of the Commonwealth. The company have also secured a charter from the State of Maryland equally broad in its privileges with the franchises they enjoy in this State. The pipe lines represented in the new organization, or the reorganization of the Pennsylvania Pipe Company, are the Grant, Karus, Keystone, Antwerp and Oil City Relief, and Atlantic. The following are the officers elect: President, Henry Harley; vice president, J. T. Jones;

treasurer, C. W. Batchelor; secretary, Wm. H. Abbott; chief engineer, Herman Haupt; general superintendent, Wm. Warmcastle. The project seems to meet with great favor from the producers, as promising to cheapen the cost of transportation of this great staple."

As to the location the engineer, Mr. Haupt, says: "I propose a line ascending rapidly from the Allegheny River and following the table lands along the water-sheds of the country, passing about twelve miles north of Indiana and striking the Ebensburg branch of the Pennsylvania Railroad at Bradley's Station; thence to Cresson, along the pike in close proximity to the railroad; from Cresson, an air line of fourteen miles will strike the intersection of the Hollidaysburg Branch at Brook's Mills; thence following the general direction of the railroad. The next sixteen miles to Great Aughwick Valley will be near railroads, and from this point to Newville, thirty miles, will be over a broken country, requiring the construction of roads for distribution. The total cost of 300 miles of four inch pipe, with the expense of hauling, cutting woods, laying and ditching, etc., is estimated at \$1,250,000. The cost of transporting 1,500,000 barrels of oil from Brady's Bend to Philadelphia by a pipe line has been estimated at \$250,000, which is 16½ cents per barrel, while the minimum cost of carrying oil by rail the same distance (395 miles) is 39½ cents per barrel."

The *Dispatch* says that "The Newville, mentioned above, is one of the objective points, but the engineer having the work in charge will, in all probability, change the route somewhat. The most direct route appears to be through the gap in the North Mountain at Roxbury, from thence to Shippensburg; thence southeast along the line of the old Baltimore Road, over the South Mountain to Gettysburg, when the line will diverge to Philadelphia and Baltimore."

The pressure at the pumps is to be 900 pounds to the square inch; there are to be stations at distances of 15 miles, at each of which an engine of a hundred horse-power will be erected to work a pump to continue the flow from point to point. The engineer in chief is Herman Haupt, of Hoosac Tunnel fame, and who, during the war, was chief of the Bureau of Military Railroads.

The *Boston Traveler*, commenting upon the scheme says: "In view of the enormous product of oil in this country—30,000 barrels per day—and the rank it now holds among the leading articles of export, coupled with the exorbitant charges for railroad carriage from the wells to the seaboard, by the completion of the enterprise and its successful operation a complete revolution will be accomplished in the handling of this article."

The feasibility of this enterprise, so far as the passage of the oil through the pipes is concerned, has been fully established by the present system in operation in the oil regions, where the aggregate length of the pipes conveying the oil from the several wells to the reservoirs is nearly 250 miles.

Shipbuilding on the Clyde.—The *British Trade Journal* says: "The prosperity for which the Clyde shipbuilders were so long envied by their brethren in the south seems to be drawing to a close. Whereas men in Clyde yards used to work longer hours and take lower wages than those on the Thames or the Tyne, they have latterly changed to working the shortest number of hours and demanding the highest rate of wages. Orders are consequently being transferred to Belfast and elsewhere. The amount of building in progress has not as yet greatly diminished, but builders do not see their way to much new work for the winter. According to a local report from the upper district of the Clyde, only 15 vessels were launched there during the month of July. The aggregate tonnage amounted to about 15,000 tons; and of these vessels there were 10 sailing ships and 5 steamers, the steamers representing about 4500 tons of the gross tonnage. In Govan, where there are 5 of the largest shipbuilding yards on the Clyde, there were only 3 vessels launched during the month, and these were, in the aggregate, 3400 tons. At Partick and Whiteinch there were 6 launches, comprising 4700 tons, mostly for the Indian and New Zealand trade. Dumbarton has one or two yards closed, and one of the oldest builders is finishing the last two vessels for which he has orders. Greenock and Port Glasgow report 7 launches during the month, the finest being intended for the Australian trade. The other Greenock vessels are mostly coasters of small tonnage, and the whole production for the month of July on the Clyde is certainly below the average."

Vaucanson.—The *Cincinnati Trade List* says: A monument to the memory of Vaucanson, the great mathematician of the last century, has recently been erected at Grenoble, France. It is to the ingenuity of Vaucanson that the world owes the invention of the chain for communicating motion at a distance. Through the application of this principle he was enabled to construct the first spinning machine and his wonderfully clever automata. It is said that among these last marvels of mechanism was a duck which could waddle on a dry surface and swim in the water; which could quack, eat and drink, and actually digest its food by means of chemicals introduced into the stomach. Vaucanson was not a favorite with the Court of France; and when his name was proposed to the Academy of Sciences he was refused admission through the influence of his enemies among the aristocracy. Louis XV was well pleased with the action of the Academy—remarking, when the intelligence was brought to him of the defeat of Vaucanson: "We will ask him to construct for us an automaton Académicien." Vaucanson's collection of machines, models, etc., formed the nucleus of the *Conservatoire des Arts et Métiers* and Brevets d'Invention of Paris.



## BUSINESS ITEMS.

## MASSACHUSETTS.

The White River Iron Foundry, at Hingham, owned by Thomas Weston, was burned last week, with a warehouse and dressing shop adjacent. Loss, \$25,000; insurance, \$11,000.

A Taunton machine shop has contracted to furnish 40,000 spindles to a Fall River shop. This will keep them busy six months.

## CONNECTICUT.

All the factories and workshops at Winsted are running except Lathrop's Cutlery Factory, and that is expected to start as soon as there is a supply of water.

The strike of the molders at Sargent's Factory, in New Haven, is assuming a serious aspect. Two men who continue at work have been violently treated by gangs of strikers.

The workmen at Parker's Screw Works, at Meriden, got their wages raised one-third because the price of screws went up.

## NEW YORK.

Both of the Alcott furnaces are at present out of blast, but one will soon blow in to work off stock on hand.

One of the Poughkeepsie furnaces is in blast and the other will soon be.

The Southfield Furnace has been in for about 10 weeks, and is doing good work.

Burden is getting ready to blow in one furnace.

The Greenwood Furnace has been in blast for 5½ years, and is still in good condition.

The Cedar Point, one Crown Point and the Fort Edward furnaces are running on Bessemer pig.

## PENNSYLVANIA.

The St. Charles Furnace, at Columbia, recently blown out for relining, was put in blast again last week, and is said to be working well.

One of Coleman's North Lebanon furnaces will be blown in the 1st of October, which will make two in operation.

The Shenango Furnace Co., of Middlesex, put their second furnace in blast last week.

The Altoona Mirror draws this sad picture of the state of affairs over there: "From day to day numbers of employees are discharged from the railroad company's shops in this city. Inquiry develops the fact that in some departments there is scarcely any work at all on hand, while in others there is barely enough to employ the hands. While there is thus a daily increase in the number of idle ones, there is no preparation making for the care and help of the poor during the winter."

The glass house of Mr. G. W. Wells, Brownsville, is in operation again, making better glass than ever.

The rolling mill of Jacobs & Jackson, Brownsville, is working day and night. They make all kinds of bar, pipe iron and light T rails.

The Shenango Furnace No. 1, Middlesex, blew in on the 9th, at about midnight, and is doing as well as could be expected. No. 2 is not doing much; the gas flues in the stack fell in and caused a good deal of delay, keeping the blast off eight or ten hours, and giving a great deal of trouble generally. These furnaces are of the small order, built before furnacing had become a science. One of them is a 10 ft. 8 in. bosh, and the other is 19 ft. 6 in. bosh; the lining is of Barnes' brick, and the crucibles Mount Savage 9 in. brick. They were out something like two years, and that accounts, to some extent, for the trouble with the flues, etc. The blowing cylinders are of 72 inches each, and are clumsy affairs—too much machinery in motion to do the required work. There is another engine attached to the works, a vertical one, made at the Globe Works, Cleveland. The whole works look neat and tidy.

Baird & Huston, of Philadelphia, have just closed a contract to supply the Westcott Printing Company with about \$1,000,000 worth of machinery.

The Crane Iron Company, on Thursday of last week, completed blowing out No. 5 furnace, and at present there is no likelihood of another being lighted. But two furnaces are now in blast, Nos. 2 and 6.

## PITTSBURGH AND VICINITY.

The purchase money from the sale of the Pittsburgh Bolt Works, sold by the sheriff about 10 days ago, less bills for taxes, costs, etc., netting \$83,879, has been paid over to the creditors. The whole amount was \$100,055.

The sales of pig iron and iron ore for the past week show a very gratifying increase. Of pig iron the sales amounted to 3005 tons, and of ore 3025 tons.

Messrs. Lindsay & McCutcheon have resumed work in the boiling department of the mill which was lately burned.

Kier Bros. have lately added a third calcining kiln at their Salina Fire Brick Works, having a capacity of 50,000 bricks. This makes their total capacity at these works 150,000 bricks.

The Danks furnaces at Graff, Bennett & Co.'s, are in most successful operation. Each furnace yields about 5300 lbs. in 6 heats, the charge being 900 lbs.

Mr. J. C. Bidwell, of the Pittsburgh Plow and Crucible Steel Casting Works, has purchased the patterns and good will of the Crucible Steel Casting Company.

Messrs. Mackintosh, Hemphill & Co. are hard at work on the pair of blast engines for the furnace of the Southern States Coal and Iron Company, at New Pittsburgh.

Porter, Bell & Co. are building a small engine for the Pennsylvania Steel Company, Harrisburg. It is only 6x10 cylinder.

The window glass factories may now be said to have been closed, owing to another lock-out occasioned by a refusal of the "gathering" boys and "tenders" to accept a reduction from last year's rate of wages. The Western Window Glass Manufacturers' Association, at its late meeting in Chicago, resolved to make a reduction of 10 per cent. in the wages of these employees, and announced that at that rate the dif-

ferent factories would start in on next Monday. The boys, although receiving 30 per cent. higher rates than were paid in the East, resolved not to accept the reduction, and notified the employers of their intention last Thursday. Only three houses were in full blast, Estepes, Chambers and Himsen's on the South Side, and the bars in these furnaces were pulled Friday. It is said that these tenders make from \$20 to \$30 per week.

## WEST VIRGINIA.

The nail factory at the Belmont Mill, Wheeling, will be idle this week.

## OHIO.

The Zanesville Burnace is being cleaned out, preparatory to relining. It will not go in for three or four months.

Cartwright, McCurdy & Co., and the Youngstown Rolling Mill Co., are largely engaged in manufacturing cotton tie for the Southern trade.

The Sheridan Coal Works are now erecting two Belgian ovens for the manufacture of coke. An analysis of coke made of Sheridan (No. 6) coal has resulted as follows:

Carbon.....87.845  
Moisture.....4.970  
Ash.....8.985

Per cent. of sulphur.....1.316  
Per cent. of phosphorus.....0.0026

## CLEVELAND AND VICINITY.

The Siemens-Martin Steel Horseshoe Factory, in connection with the Cleveland Rolling Mill Co.'s Works, is turning out with one machine, four tons per day of ten hours. The shoes manufactured are a decided improvement on the old style, and are manufactured under the letters patent of Mr. Hale. We noticed these at length in our issue of May 11th, 1876.

The new factory for the manufacture of horseshoe nails and light hardware is now erected and ready for occupancy. One of the proprietors is now in Vermont purchasing machinery for the works. The gas from the well sunk at the plate mill is now being used to light up the works. An abundant supply is constantly on hand. No. 2 blast furnace is doing excellently well. Last month she turned out 54 tons of No. 1 iron per day. This month, so far, she has turned out an average of 58 tons per day.

The bosh and the brick work on No. 1 blast furnace will be completed Saturday evening. It will take about two weeks to dry her out and then she will be blown in. The iron stack is almost completed. A winding stairway has been built around an iron column. It is a considerable improvement to the old wooden house.—Advocate.

The sales of the Lake Erie Iron Company, Cleveland, for the last seven months have exceeded those of the same period last season. The company do little in the way of merchant iron, confining themselves to railroad, forge and heavy bar iron. Orders are coming in daily, and a full force is employed.

The King Iron Bridge and Manufacturing Co., Cleveland, are working their men regularly on ten hours, time. Business is considerably better than it was at this time last year. Since the first of January the company have received orders for 17,000 linear feet of bridge from all parts of the country.

Blast Furnace No. 1, Cleveland Rolling Mill Co., has been fired up since Monday, the 4th inst., for the purpose of drying her out. She will be ready for the wood Monday, the 25th inst.

## MICHIGAN.

The two stacks of the Pioneer Furnace, located at Negaunee, in this county, were blown out last Wednesday, and it is not certain when they will resume. This furnace is the property of the Iron Cliffs Company, and, as its name indicates, is the oldest in the district. The first stack commenced making iron in February, 1858, two stacks having made considerably over 100,000 tons of pig iron since she commenced operations. About 12,000 tons are now on hand.

## LAKE SUPERIOR.

We condense the following from *Iron Home*: The Cleveland Mine leads the van in shipments so far this season. The Republic is second.

The Bessemer Mine has a force at present of 50 men, but as soon as the improvements are completed and the track laid this force will be increased to 100.

We hear good reports of explorations now being made on properties adjoining the Cambria and Bessemer mines. That the Teal Lake property is rich in mineral, there is no longer room to doubt.

We have been informed that work at the Parson Mine, belonging to the Lake Superior Iron Company, is about to be resumed, and that already there is a force of men at work cleaning up the mine, preparatory to beginning mining operations.

The Lake Superior Iron Company have discovered a fine vein of ore in the Bray pit. The new skip was put in motion on Saturday last, and quite a number of tons have already been raised.

It is reported that the Goodrich Mine is soon to be started up again. The same is said of the Howell-Hopcock.

The Washington Mine has been leased by Messrs. Lonstorf, Maas and Mitchell, of Negaunee, for a term of 20 years. The work of cleaning up and getting machinery in running order will be commenced at once, and everything got in readiness for resuming mining operations at an early day. This property has been lying idle for some time. Forty men are at present employed at the Shenango Mine, but this force will be increased as the work progresses. The first shipment, consisting of 20 cars, was made the beginning of the week.

The Winthrop Mine never looked better than it does to-day. A force of 50 men are employed, and the shipments average in the neighborhood of 40 cars per day. Mr. Colwell informs us that it is his intention to increase the force in a short time to 100 men. A new discovery has just been made a few rods south of the hematite opening. It is a vein of hard ore about 12 feet wide; a shaft is being sunk, and should it prove to be of large magnitude, it will greatly enhance the value of the property.

The Michigan Company have greatly increased their working force during the past few weeks, and we think will do a large amount of work the coming fall and winter.

The Republic Mine is working a strong force, and getting out a large quantity of ore.

## ILLINOIS.

The United States Rolling Stock Company intend to erect extensive car and rolling stock

shops in Chicago. Agents of the company are looking for a suitable site.

## INDIANA.

James B. Wilks, late puddling boss of the Western Iron Company, Sharon, is to take charge of the rail mill at Evansville.

## TENNESSEE.

The new mill of Messrs. Scofield & Co. will raise steam this week for the first time, to see if all things are in trim. They will be ready for operations in about 10 days.—Chattanooga Commercial, 12th.

**Sheridan (O.) Coke.**—Considerable attention is now being paid to the Sheridan coke. The company finding that they can do a good thing by pushing the manufacture have ordered the building of a couple of Belgian ovens, capable of turning out about 150 bushels of coke every 48 hours. These will be done in about two weeks. We have seen an analysis of this coke by Prof. Charles E. Dwight, of Wheeling, who gives its constituents as follows:

Carbon.....87.845  
Moisture.....4.970  
Ash.....8.985

Per cent. of sulphur.....1.316  
Per cent. of phosphorus.....0.0026

Character of coke, hard and bright.

Prof. Dwight further says: "This is a good coke for blast furnace use or any other purpose. The tendency of the sulphur is to make a red-short iron, just the thing for nail manufacturers." The coke in question was burned 72 hours. With the new Belgian ovens it will be burned only 48 hours, this producing more carbon and less sulphur. We hope to soon be able to record the establishment of this branch of manufacture at Sheridan on a large and remunerative scale. Lawrence county can furnish coal for all this valley and coke too.—Iron Age Commercial.

## Special Notices.

ASSIGNEE'S SALE  
OF  
HARDWARE, CUTLERY and GUNS.

**BISSELL, WELLES & MILLET,**  
Auctioneers,

Will sell at Auction on Friday and Saturday, Sept. 29th and 30th, at 10½ a. m., by order of ISAAC MEYER, Esq., Assignee, the entire stock of

## Hardware, Cutlery &amp; Guns

of  
**Messrs. MEYER & KASTER,**

at No. 129 Duane Street, New York.  
This stock is valued at over \$25,000, and comprises a large line of Table Cutlery, Eng. and West-aholm's Pocket Cutlery, Wade & Batchers', Rodgers' and Wostenholm's Razors, large stock of fine Scissors, Butcher and Bowle Knives.

Also Powder Flasks, Gun Material, Pistols, 500 Double Shot and Breech Loading Guns.  
Also American and English Shelf Hardware, Padlocks, German Halter and Coil Chain, Hand, Panel and Back Saws, &c., &c. Also Samples, Desks, Show Cases, &c.

This sale will be worthy the attention of the trade. Catalogues ready morning of sale. Terms of sale, cash.

**BISSELL, WELLES & MILLET, Auctioneers,**  
15 Murray Street, N. Y.

## AUSTRALIA.

**AGENCIES.**—B. O. HOLSTERN, of B. O. H. & Co., Sydney, Australia, will undertake Agencies on reasonable terms for the Australian colonies. Undeniable references. Communications up to October 15 may be addressed to him at the *Adelaide House*, 4th Avenue and 24th Street, New York; or up to October 5 to Mr. Wilmet, 553 Broad Street, Philadelphia.

**WANTED** by a practical pattern maker with a family, situation where general work is done, or railroad or manufacturing shop. Steady place preferred. Address, DANVILLE NOVELTY FOUNDRY, Danville, Ills.

**The "Common Sense" Hay Cutters,**  
"VICTOR" CORN SHELLERS,  
And "PRIZE" CHURN are the best.

**A. B. COHU, Manufacturer,**  
197 Water St., one door from Fulton, New York.  
"Everything for the Farm," containing illustrations of 20 of most improved Implements for Farm, sent on receipt of 10c.

## NOTICE.

## Water Filters.

**BATTERSEA, LONDON, July 1, 1876.**  
We beg to advise the trade and public that we have appointed Mr. H. R. MESSING, 62 Water St., N. Y., sole agent for the sale of our well known **Silicated Carbon Water Filters.**

## SEWING MACHINES FOR EXPORT.

1000 Double Thread Lock Stitch "Bartram" Sewing Machines, elegantly finished, easy and quick working, **saleable**, will be sold very low for cash. Inspection solicited.

**THE HULL & BELDEN CO., Danbury, Ct.**  
We need the room which these occupy, and will sell them **extremely low**, if they can be removed before Oct. 1st.

## Wanted, Light T Rail.

Parties having for sale 50 to 100 tons of **slightly worn**, 25 to 35 lbs. T Rail, can find a purchaser at a reasonable price, by addressing (with price delivered in New York or Philadelphia.)

**D. G. AMBLER, Utica, N. Y.**

**E. HAMILTON HUNT,**  
**Hardware Commission,**  
69 LAKE ST., CHICAGO.

Consignments solicited. Best of references in New York and Chicago.

## SPECIAL NOTICE

A new style of  
**MEN'S SINGLE GUNS,**  
in addition to the former line of A. Simon's, Liege, now offered.

**SILESIA SHEET ZINC,**  
Imported by  
**LOUIS WINDMULLER & ROELKER,**  
20 Reade Street, N. Y.

Specialties of Wrought, Cast, or Sheet Iron or Brass.

Made to order in a SUPERIOR MANNER, AT LOW PRICES, by the  
**CORRUGATED METAL CO., East Berlin, Conn.**

## Special Notices.

**WANTED.**—A first-class business man familiar with machinery and manufacturing, capable of handling large bodies of men, desires a responsible position. References satisfactory. Address, **IRON AND STEEL,**  
Care of P. O. Box 813, Bridgeport, Conn.

**HALL & HARBESON,**  
Manufacturers of  
**Chemical & Physical Instruments,**  
191 Greenwich Street, N. Y.

**SPECIALTY.**—BURNER'S GAS BURNERS, for all heating purposes; BURNER'S IMPROVED GAS COMBUSTION FURNACES, with 10, 15 and 25 burners. Fine Brass and Metal Work made to order for Metallurgists, Chemists, Experimenters, Colleges, &c.

**TO LET,**  
**A Light, Handsome Office.**

Possession Immediately.  
**HERMANN BOKER & CO.,**  
101 Duane Street, N. Y.

## NOTICE! POND'S TOOLS.

The undersigned has assumed the Personal Property, including accounts, finished and unfinished Machinery, good will &c., connected with the manufacture of Machinery's Tools as conducted by Mr. Lucius W. Pond since 1847, and will continue the said business at the old stand, cor. Union and Exchange Sts., Worcester, Mass., under the name of **DAVID W. POND, Successor to Lucius W. Pond.**

**CARD.**—Having assumed the business mentioned above, I solicit Inquiry and Patronage, with guarantee that present standard of Workmanship, and quality of Machinery shall be maintained. A large quantity of New and Second-Hand Tools, ALL SIZES and SIZES, For Sale at Low Prices. Send for list of second-hand tools Store at 98 Liberty St., New York, will be discontinued from Feb. 1, 1876, and all sales made from manufactory.

Respectfully, **DAVID W. POND,**  
Successor to LUCIUS W. POND.

**SECOND-HAND**  
**Machine Tools.**

Five 15 in. swing 6 ft. bed Screw Cutting Engine Lathes. One 21 in. swing 8 ft. bed Screw Cutting Engine Lathes. One 14 in. swing 4 ft. bed pulley feed Lathes. One 13 in. swing 5 ft. bed, pulley feed Lathes. Six Common Milling Machine. One No. 3 Smith & Garvin Milling Machine. One No. 4 Smith & Garvin Milling Machine. One 2 Spindle Profiling Machine. One 1 Spindle Profiling Machine. One No. 3 Brown & Sharpe Screw Machine with chasing bar. Three 4 Spindle Drills. One No. 3 Fowler Press. One 2 in. Bolt Cutter. Four No. 1 "Pond" Drills 21 inch swing. One 3 ft. Radial Drill. One 34 in. x 35 ft. Planer.

The above tools have been little used, will be sold very low and can be seen at the store of

**GEORGE PLACE,**  
121 Chambers & 103 Reade Streets, N. Y.

**ALLIS, BULLARD & CO. (Limited),**  
**Railway Supplies, Machinery & Metals,**  
14 Dey Street, New York.

Offer for immediate delivery the following list of Tools and Machinery, viz:

One 13 x 30 inch Greene Cut-off Engine, in perfect order; one Brown & Sharpe Universal Milling Machine; one No. 1 Screw Machine with lot of Tools; one 8 inch Pratt & Whitney Shaper; one 16 inch Planer, and 13 inch x 4 feet Lathes; one Pond Planer, 22 x 5 ft.; two Fowler Presses, one 800 lb. Merrill Drop, and lot 15 and 18 inch Lathes; all in excellent condition.

## SPECIAL NOTICE.

Having established ourselves in business in this city for the sale of

**AMERICAN HARDWARE, HOUSE-FURNISHING GOODS, AGRICULTURAL IMPLEMENTS, Etc.,**  
we beg to solicit correspondence with parties desirous of being represented by us in Germany and surrounding countries.

**HAMMACHER & DELIUS.**

HAMBURG, Germany, April, 1876.

House in N. Y., A. HAMMACHER & Co., 209 Bowery.

## MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/4; every additional line, 10d. Price, 6d. per Copy, or 30/ per annum, inclusive of postage to the United States.

**Steel Castings.**

Sold and Homogeneous. Guaranteed tensile strength, 25 tons to square inch. An invaluable substitute for expensive forgings, or for Cast Iron requiring great strength. Send for circular and price list to

**CHESTER STEEL CASTINGS CO.,**  
Evelina St., Philadelphia, Pa.

**ATTENTION** is invited to the fact that Goods, were entered according to Act of Congress in the year 1876, in the U. S. Patent Office.

**IN ADDITION** to Auger Bits, I make **extension Lip**, Car Machine, Dowel and Hand Rail Bits, also of Boring Machine, Carpenters' and Millwrights Augers. All my goods are solid **CAST STEEL**, and perfectly made by means of my Patent Machinery.

## SPECIAL NOTICE.

I have three patents for Dies, Machinery, and Tools for making Augers and Bits, each running seventeen years; dated as follows: Dec. 19, 1865; January 31, 1866, and July 3, 1866. **There is a special claim on each of the Dies** for persons infringing on said patents will be held responsible to the extent of the law. **Russell Jennings.**  
DEER RIVER, Conn., Sept. 7, 1874.

**Wanted—A Partner,**

In a foundry and machine business, already well established. Locality splendid and healthy.

A practical man with means is wanted to join a practical man who is already well established.

Address **CAR WHEEL FOUNDRY,**  
P. O. Box 134, Selma, Alabama.

**Briesen's Patent Agency**

FOR SECURING INVENTIONS, TRADE MARKS, &c., IN AMERICA AND EUROPE.

**No. 258 Broadway, New York.**  
**A. V. BRIESEN.**

## VENTILATING &amp; STEAM HEATING.

A thoroughly competent engineer, with extensive experience in the above line, desires employment.

Address  
Office of *The Iron Age*, 10 Warren St., N. Y.

## Special Notices.

**A. PURVES & SON,**  
Corner South & Penn Streets, Phila.,  
Dealers in

**Scrap Iron & Metals, Machinery, Tools, Shafting & Pulleys, Steam Engines, Pumps & Boilers, Copper, Brass, Lead, Babby, Metals, Foundry Facings. Best Quality Ingot Brass.**  
Cash paid for all kinds of Metals and Tools.

**FRANKLINITE IRON ORE.**

The average assay of this ore yields 67 oxide iron, 17 oxide of manganese, no sulphur or phosphorus. The large percentage of manganese renders this ore valuable for steel making or mixing with other iron ore, 10 to 12 per cent. of this ore is used in puddling furnaces cures red short and cold short in the iron; infused at Sterling Hill, Sussex County, New Jersey. Parties wishing to purchase or contract for future delivery of this ore, can address

**DIXSON & TROTTER, 35 Spruce St., N. Y.**  
20 tons residuum of this ore, after zinc is burnt out, for sale.

**EXPORT TO RUSSIA!**

Having established ourselves in this city for the sale of **American Machinery, Hardware, Agricultural Implements and Technical Products** generally, we beg to solicit correspondence with manufacturers desirous of being represented in Russia. Familiar with the want of the country, and, as civil engineers, brought in contact with the industrial interests, we are enabled to introduce successfully American products to the trade.

Address **HARTOCH BROS.,**  
Kasanka 46, St. Petersburg, Russia.

**Edson's Steam and Pressure Recording**

**Gauge for Steam or Water.**

The inventor of this combined "Pressure Recording Gauge" and "High Pressure Alarm" have, after many years of persistent effort and at great expense, succeeded in perfecting a reliable and accurate instrument for measuring either air, steam or water, when subjected to pressure, and for denoting the same by a tracing upon Edson's Patent Log or "Chart." No manufacturer or steam user can afford to be without them. Adopted by the United States Centennial Commission for competitive test at the present Exposition, and has also been used by the American Institute for several years past as a standard gauge. To be found at the Centennial Exhibition under D 9, column 67, Machinery Hall. Circulars sent on application to

**M. B. EDSON, 91 Liberty Street, N. Y.**

**WANTED.**—A situation as cook-keeper in any

business, or clerk in iron store; have been in the wholesale and retail iron business with one firm thirteen years, both as book-keeper and clerk. Can give best of references. Address **H. F.,**  
Box 748, Hartford, Conn.

**DROP FORGINGS.**

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

<



# Trade Report.

Office of THE IRON AGE,  
WEDNESDAY EVENING, Sept. 20, 1876.

During the past week there has been some activity in the financial markets, and with the exception of coal stocks the prices of securities have advanced. There are no indications of a recovery in coal stocks, and the condition of the roads depending mainly upon coal traffic is certainly very far from encouraging to those who hold these stocks and bonds as securities. The D. L. and W. has published a statement of its financial condition, which makes a somewhat better showing than was expected. The money market has been easy. Borrowers on call have been abundantly supplied at 1½ @ 2½ per cent. The quotable rate of discount on commercial paper is 4 @ 6 per cent. More is offering than for some time past, owing to the increased activity in general trade, and the large demand for currency for legitimate business purposes.

The gold market has been steady, and without feature of general interest. The following shows the daily range of the premium since the date of our last issue:

	Highest.	Lowest.
Thursday.....	110½	110
Friday.....	110½	110
Saturday.....	110½	110
Monday.....	110½	109½
Tuesday.....	110½	110
Wednesday.....	110½	110

Government bonds have been steady and strong. The banks are applying for large amounts of the new 4½ per cents., and the syndicate make encouraging reports of the progress of their negotiation. State bonds remain steady and dull. Railway mortgages generally are strong, but those of the coal roads are weak, and have fluctuated considerably during the past few days. We give below the closing quotations of governments.

The stock market has been in the main strong, and there has been some speculative activity. Coal shares were depressed and neglected, and New York Central was the object of a well organized "bear" movement. The principal dealings have been in Lake Shore, D. L. & W., N. J. Central, Western Union, Michigan Central, Pacific Mail and Erie. We give below the quotations of active shares at the close of business to-day.

The bank statement shows a gain of \$1,319,900 in total reserve, and of \$537,750 in surplus reserve, the latter now standing at \$23,077,775. A good feature is the expansion of \$2,199,400 in loans, which shows that the improvement in general trade is more fully employing bank facilities. The following is a comparison of the bank averages for the past two weeks:

	Sept. 9.	Sept. 16.	Differences.
Loans.....	\$258,431,100	\$260,630,500	Inc. \$2,199,400
Specie.....	22,728,400	22,494,200	Dec. 234,200
Legal tend.....	57,529,000	59,283,100	Inc. 1,754,100
Deposits.....	231,069,500	234,198,100	Inc. 3,128,600
Circulation.....	14,371,900	14,455,000	Inc. 83,100

The foreign trade movements for the week are shown by following tables:

IMPORTS.			
For the week ended Sept. 16.			
	1874.	1875.	1876.
Total for week.....	\$6,669,592	\$5,762,468	\$5,001,875
Prev. reported.....	288,767,563	245,867,919	204,003,602

Since Jan. 1.....\$95,497,515 \$251,630,387 \$309,005,477

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Anvils.....	299	\$2,738
Brass goods.....	16	3,306
Bronzes.....	12	8,932
Chains and anchors.....	43	2,250
Cutlery.....	63	15,190
Guns.....	25	4,945
Hardware.....	15	1,192
Iron ore, tons.....	1,100	2,163
Iron, plat, tons.....	565	21,774
Iron cotton iron.....	285	12,117
Iron, other, tons.....	212	22,115
Lead, pigs.....	2,243	14,821
Metal goods.....	157	16,142
Needles.....	15	6,372
Old metal.....	13	2,072
Per. caps.....	13	2,072
Saddlery.....	8	1,277
Steel.....	1,331	19,131
Silverware.....	7	1,025
Tin, boxes.....	16,447	79,909
Tin, 710 slabs.....	135,588	29,911
Wire.....	55	1,090

EXPORTS EXCLUSIVE OF SPECIE.

For the week ended Sept. 16.			
	1874.	1875.	1876.
Total for week.....	\$4,304,724	\$4,620,232	\$5,422,571
Prev. reported.....	208,359,021	177,238,970	186,606,623

Since Jan. 1.....\$181,713,745 \$181,909,302 \$192,029,194

EXPORTS OF SPECIE.

For the week ended Sept. 16.			
	1874.	1875.	1876.
Total for week.....	\$4,304,724	\$4,620,232	\$5,422,571
Prev. reported.....	208,359,021	177,238,970	186,606,623

Same time in 1874.....\$4,304,724

Same time in 1875.....\$4,620,232

Same time in 1876.....\$5,422,571

Government bonds close as follows:

	Bid.	Asked.
U. S. Currency 6s.....	106½	107
U. S. 6s 1881, reg.....	117½	118
U. S. 6s 1881, cou.....	115½	116
U. S. 5-30 1885, reg.....	112½	113
U. S. 5-30 1885, cou.....	112½	113
U. S. 5-30 1885, new reg.....	113½	114
U. S. 5-30 1885, new cou.....	113½	114
U. S. 5-30 1887, reg.....	116½	117
U. S. 5-30 1887, cou.....	116½	117
U. S. 5-30 1888, reg.....	119½	120
U. S. 5-30 1888, cou.....	119½	120
U. S. 10-40 reg.....	114½	115
U. S. 10-40 cou.....	115½	116
U. S. 5s 1881, reg.....	115	116
U. S. 5s 1881, cou.....	115	116
U. S. 4½s.....	111½	112

The following were the closing quotations of active shares at the close of business to-day:

	Bid.	Asked.
Atlantic & Pacific R. R. Preferred.....	15½	16
Atlantic & Pacific Telegraph.....	15½	16
Chicago & Northwestern.....	26½	27
Chicago & North Western.....	26½	27
Chicago, Rock Island and Pacific.....	61½	62
Chic. & Quincy.....	119	120
Col. & Ind. Cent.....	3	4
Clev. Col. & Ind. Indpls.....	35½	36
Cleveland and Pittsburgh.....	89½	90
Chicago & Alton.....	97	98
Consolidation Coal.....	50	51
Del. Lack. and Western.....	73½	74
Delaware & Hudson Canal.....	67½	68
Adams Express.....	108	109
American Express.....	60	61

United States Express.....	63	64
Wells, Fargo & Co. Express.....	83½	84½
Erie.....	10	10½
Hartford.....	130	135
Hannibal & St. Joseph.....	123½	124
Illinois Central.....	21	22
Kansas Pacific.....	84½	85½
Kansas & Texas.....	7½	8
Lake Shore.....	53½	54½
Michigan Central.....	41½	42½
Milwaukee & St. Paul.....	30½	31
Minneapolis & St. Paul.....	62½	63½
Mariposa.....	4	5
New York Central.....	98½	99
New Jersey Central.....	25½	26
New Jersey Southern.....	1	1
Ohio & Mississippi.....	12½	13
Pacific Mail.....	124	125
Panama.....	128	130
Pittsburgh & Fort Wayne.....	104½	105
Pacific of Missouri.....	3	4
Quicksilver.....	17	18
St. L., Kan. City Northern.....	5½	6
Tol., Wabash & Western.....	38½	39
Union Pacific.....	39½	40
Western Union Telegraph.....	69½	70

## GENERAL HARDWARE.

As the season advances the improved demand for goods, which we have noticed for several weeks, becomes more general, and the feeling in the trade is decidedly more hopeful than we have seen it in a long time. The tone of the market is firm, and as an evidence of this state of things we have scarcely anything to report in the matter of changes in values.

In Foreign Hardware there is a fair business doing.

The condition of the nail market is much the same as last week, the demand being fair for the season. We quote 10d. to 60d. \$3-10, net. For orders of 200 kegs and over a discount of 10 cents per keg is allowed.

Mallory, Wheeler & Co. (Sargent & Co., agents) have issued an appendix to be attached to their 1876 catalogue, containing illustrations of their new variety of Flat Steel Keyed Padlocks. We print below a descriptive price list of these goods, which are subject to the same discount and terms as their other Padlocks. These goods are put up in half dozen boxes, keys all different:

	With 1 key	With 2 keys
	Per doz.	Per doz.
No. 1029, 2½ inch, Brass Drop and Bushing, Revolving Key Pin, Flat Steel Key.....	\$3-25	\$3-81
No. 1030, 2½ inch, Brass Drop and Bushing, Revolving Key Pin, Flat Steel Key.....	4-25	4-81
No. 1031, 2½ inch, Brass Bushed, Fancy Engraved Drop, Heavy Shackle, Revolving Key Pin, Flat Steel Key.....	5-00	5-56
No. 1032, 2½ inch, Brass Bushed, Fancy Eng. Drop, with chain, Revolving Key Pin, Flat Steel Key.....	6-50	7-06
No. 1033, 2½ inch, Brass Bushed, Double Chamber, Revolving Key Pin, D'ble Bitted Flat Steel Key.....	5-50	6-50
No. 1034, 2½ inch, Brass Bushed, Fancy Engraved Drop, Double Chamber, Revolving Key Pin, Double Bitted Flat Steel Key.....	6-25	7-25

The Florence Sewing Machine Co., Florence, Mass., have issued an illustrated price list of the Florence Skates manufactured by them. The list comprises the following styles:

Florence Skates.

Every Skate warranted Steel, and free from any imperfection.

The Florence Steel Skate, with Straps. Per pair. The runners of this Skate are made of highly tempered steel castings, with Japanese metal sole and heel plates, and are furnished with heel sockets and screws, ready for use.

The Florence Spring Skate, with Straps complete. Highly polished, forged steel runners, with blue steel plates and clamps.

Florence All-Clamp Spring Skate..... \$3-50

Highly polished, forged steel runners, with blue steel plates and clamps.

Both styles of Spring Skates can be had in full nickel-plate, put up in satchels, at \$6 per pair. The following is their circular of terms and discounts, &c.:

Office of the FLORENCE SEWING MACHINE CO., FLORENCE, MASS., August, 1876.

DEAR SIR: The discount to the trade on all styles of our Skates, the coming season, will be 30 per cent. No charge for boxing and cartage.

A further discount of 2½ per cent. will be made from all net bills paid strictly within 30 days from date of invoice. This extra discount will not be made in any case if payment is delayed beyond the 30 days. All invoices subject to draft, at three days' sight, after 30 days from date.

Your attention is invited to our ample guaranty of the quality of our Skates, and your orders are respectfully solicited for immediate or future delivery.

All persons are specially cautioned against dealing in any skates constructed in infringement of our several patents, and all purchasers are hereby guaranteed that the skates made and offered by the trade by this company do not infringe any patents not controlled by us.

Respectfully yours,

THE FLORENCE SEWING MACHINE CO.

Bisell, Welles & Mullett will sell by auction, at 129 Duane street, on Friday and Saturday, September 29th and 30th, the entire stock of Hardware, Cutlery and Guns of Messrs. Meyer & Kaster. We invite our readers' attention to their advertisement on the opposite page for further particulars regarding this sale.

Philip S. Biglin, successor to W. F. Shattuck & Co. and Edward Phelan, No. 95 Reade and 113 Chambers streets, has issued an illustrated price list and discount sheet for the specialties for which he is agent. The discount sheet is as follows:

	Cash Discount from Philip S. Biglin's Price List, Sept. 15th, 1876.	Dis. per cent.
Union Scales.....	40	40
Grocer.....	25	25
Counter.....	25	25
Hatch's Counter and Tea Scales.....	35½	35½
Britannia and Cocoa Dippers.....	25	25
Yan's Cow Bell.....	10	10
Phelan's C. S. Red Rover.....	10	10
Broad Hatchets.....	35	35
C. S. Hatchets.....	10	10
Cash Iron Hatchets.....	15	15
Hammers.....	25	25
Wellman's Eureka Gimlets, Bits, &c.....	25	25
Bung Borers.....	25	25
Eureka Bung Borers.....	25	25
Nail and Spike Gimlets.....	40	40
Dbl. Cu. Gimlets and Bits.....	50	50
Cast Steel Cut Augers and Bits.....	40&10	40&10
Patent Extension Bits.....	30	30
Axe, Pick and other Hand.....	30	30
Barton's Best Hand Bells.....	20	20
Round Top.....	70&10	70&10
Eureka Flint, Sand and Emery Paper, &c.....	15&25	15&25
Tackle Blocks, &c.....	10	10

We have received the following:

TO THE TRADE: Having transferred my entire interest in the manufacture of the above

Blind Hinge to Messrs. Clark & Co., of Buffalo, N. Y., I would respectfully inform my customers, and the trade generally, that Messrs. Clark & Co. are now the sole manufacturers of this Hinge.

As we have arranged with Mr. O. S. Garretson (Buffalo Hardware Co.) for the exclusive manufacture of the above Blind Hinge, we would say to our customers, and the trade generally, that the unprecedented low prices for Blind Hinges, which have so long prevailed, compel us to advance our prices, from this date, as follows:

	Price List.	Per doz. sets.
No. 1, For wood, throws the Blind 1½ inches from the casing.....		\$3-50
No. 3, For brick, throws the Blind ¾ inches from the casing.....		5-25
No. 5, For brick, throws the Blind ¾ inches from the casing.....		10-00

Discount 60 and 10 per cent.

CLARK & CO., BUFFALO, N. Y., Sept. 16, 1876.

We call attention to the Union Spring Hinge, which has lately been improved by placing the spring in the center, as shown in the cut in the advertisement on the last page. The relative power of each size has also been increased, and the composition spring, which is durable and powerful, is nickel-plated. The hinge is easy to put on, not requiring rights and lefts. M. W. Robinson, 79 Chambers street, N. Y., is the sole agent.

The Underhill Edge Tool Company are now manufacturing the Washoe Pattern Picks, samples of which can be seen at the warehouses of their agents, Fernald & Sise, No. 100 Chambers street. F. & S. have been appointed agents for the Chalfant Mfg. Co., and have in stock an assortment of Mrs. Pott's patent Sad Irons, of their make.

The following circular explains itself:

Office of the PENFIELD BLOCK WORKS, LOCKPORT, NIAGARA COUNTY, N. Y., September 1st, 1876.

To Our Patrons and the Trade: Believing, as we do, that the present system of employing traveling salesmen to solicit and sell goods from sample is not of mutual profit to the manufacturer and the trade, and that every laudable effort to abolish or modify it should be encouraged, we have compiled and issued, at no small expense, our illustrated catalogue and price list for 1876, which we are mailing free to the trade, and which, if properly studied, will enable the buyer to select such goods as he may require, at a time best suited to his own convenience. We do not question the propriety of an occasional visit for the purpose of introducing and explaining new goods, but we do insist that the present system of "No surrender" drumming is highly injurious to the best interest of the trade, and that no extended argument on our part is necessary to convince the trade that such is the fact. We suggest as a remedy: Let the reform commence "at home," and with every firm interested, and let there be mutual encouragement, and in due time this evil may be overcome. We will cheerfully answer any questions in explanation, or regarding special goods and rates of freight. Very truly yours,

M. H. TARBON & CO.

We invite attention to the advertisement of the New Haven Copper Co., No. 255 Pearl street, on page 11. They are manufacturers and dealers in Braziers and Sheathing Copper, Kettle Bottoms, Bolts, Circles, Rivets, Ingot Copper, Spelter, Solder, &c.

It affords us pleasure to give place to the following:

NEW YORK, Sept. 20, 1876.

To the Editor of The Iron Age:—DEAR SIR: Please return our sincere thanks to the Hardware trade and others for the following liberal contributions for the sick and destitute of Savannah, Georgia:

Hermann Boker & Co.....	\$100
New York Bolt and Packing Co.....	100
D. D. Dana, Boston.....	100
Wienbach & Hilger Hardware Co.....	100
Sargent & Co.....	100
F. & W. Clatworthy.....	25
Fraser, Bell & Loughran.....	25
Brown Brothers.....	25
Althoff, Berzmann & Co.....	25
Miller, Morrison & Co.....	25
Berion, Alexander & Waller.....	25
Geo. W. Bruce.....	25
Howard, Sanger & Co.....	25
L. Heyniger & Co.....	25
W. S. Butcher.....	25
Horace Darrie & Co.....	25
Wallace & Sons.....	25
New York Plow Co.....	25
W. S. Butcher.....	25
Merwin, Hubert & Co.....	25
Asline Ward.....	25
Travers Brothers.....	25
Alfred Field & Co.....	25
North Carolina Handle Co.....	10
Cash.....	20
Charles Parker.....	100
Mallory, Wheeler & Co.....	100
Schovelberg & Day.....	50

The amount \$1500, has been forwarded to Mr. George L. Cope, Treasurer of Savannah Benevolent Association.

Yours, very respectfully,

PALMER & DEFFISH, Of Savannah, Georgia.

## BRITISH IRON MARKET.

(Specially reported by cable for The Iron Age.)

WEDNESDAY, Sept. 20, 1876.

Scotch Pig.—The market is active with an improving demand, and a large business has been done. Prices are firmer. The following are makers' prices:

Garisherrrie No. 1.....	61/6
Glenarnock No. 1.....	62/6
Schovelberg & Day.....	62/6
Eglinton No. 1.....	56/6

No change to note in Manufactured Iron.

Rails.—There is a better demand for Rails, and a large business has been done. Prices, however, remain weak. We quote Welsh, 25 @ 25. 5/.

## IRON.

American Pig.—The feeling of the trade generally shows a decided improvement, and the sales of Pig Iron are larger than for some time past. Almost all the companies have made sales at our quotations, the Thomas Company reporting 3000 tons. Prices are very firmly maintained, and we know of offers for large quantities of Iron at a slight concession from our quotations being declined by the manufacturers. We continue to quote without change:

No. 1 Foundry, \$22; No. 2 Foundry, \$20; and Gray Forge, \$19 @ \$20, many companies holding at the latter figure.

Scotch Pig.—The market is slightly easier, and sales have been small. We note the sale of 200 tons Glenarnock on private terms. We quote: Glenarnock, \$27 50; Coltness, \$28 50; Eglinton, \$26 50.

Rails.—We have no sales to report, and quote Iron at mill, \$38 @ \$40; Steel, \$54 @ \$56.

Old Rails.—We quote nominally, \$21, without sales.

Scrap.—We note the sale of 200 tons Wrought Scrap from yard at \$26 50. We quote: \$26 @ \$28.

## METALS.

Copper.—Since the purchases for export became known there has been more anxiety to buy Copper, and between 300,000 and 400,000 pounds Lake Superior have changed hands on the spot at 20c. @ 20½c. The asking price at the close on the spot is 21c. A lot of 100,000 pounds Lake Superior Copper is reported sold for December delivery at 21c. For Baltimore, we hear the price of 20c. has been refused. In order to form a judgment as regards the position of the Copper trade, we have to take into consideration the following statistical items: "The stock on January 1, 1876, in possession of the Calumet and Hecla Co., at New York, was estimated at 5,000,000 pounds, while in other hands there were 7,000,000, making a total of 12,000,000 pounds. The product of the Lake Superior mines since the close of navigation in 1875, to the same period in 1876, may be safely put down as 22,000,000 pounds, so far as the Calumet and Hecla Co. is concerned, and 14,000,000 from the remaining mines, thus summing up 36,000,000 pounds. To this there will have to be added the







## EAST INDIES.

(Gliffon, Wood &amp; Co.)

SINGAPORE, July 29, 1876.—Tin.—Has declined, and the market closes at \$22 per picul. The latest news from Penang quotes the market rather firmer at \$21.44 per picul for unsmelted tin, with buyers for China.

(Gliffon, Wood &amp; Co.)

PEKING, July 29, 1876.—Tin.—The market opened at \$20.90 to \$21 and \$21.90 per picul for unsmelted, on departure of last mail, and the market was nearly cleared at \$21.85 per picul for unsmelted. Since then a further advance could be established; the metal running up to \$21.75 per picul for unsmelted, but on account of higher rates of exchange, receded again to \$21.65 per picul for unsmelted. Stocks in the bazaar aggregate about 900 piculs. Exchange.—The sterling rates experienced a further decline, the closing quotation for last mail being 3/4 for 3/6 for 6 months' sight bank paper. Immediately after departure of same, the rates further gave way, reaching at one time 3/4 to 3/5, but subsequently took a somewhat firmer tendency, and close for this mail as follows: London 6 months' sight bank 3/4; credits, 3/4; documents, 3/4. Bombay and Calcutta on demand, bank 2/4; Hongkong on demand, bank par; Singapore on demand, private 1/4 to 3/4 per cent. premium; Pillar dollar, 1/4 per cent.; 1/2 guilder piece, 1/2 cents.

## AUSTRALIA.

(York Point Advertiser.)

ADELAIDE, July 11, 1876.—Copper.—The Kurilla Mine.—Every satisfaction is felt as to the prospects of this mine. The sales of ore are gradually increasing, and the deepest worked parts are improving. A sale of 80 tons of ore has just been made, and three piles are now lying on the floors, being sampled and waiting for tenders, of over 100 tons of 30 per cent. or above, and over another 100 tons remain for future sale. The ore is sold at the Kurilla lode, in the 35 fathom level eastward toward the Devon consols, is very rich, being nearly 4 feet of solid yellow ore of 30 per cent. or above. Since our last monthly summary several important and required changes have been made. The old engine of the engine has been removed, and a new one built of much better material, and consequently of much greater strength. A complete new balance has been made, and a splendid new piston and rod have been made by Messrs. May & Tonkin, of the Watral Foundry, to replace the old ones that had become worse for the wear.

## Our English Letter.

## Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, ENG., Sept. 4, 1876.

## THE EASTERN WAR

continues to attract great attention here, and in well informed circles an opinion prevails that we are now on the eve of a most grave crisis—a crisis which may involve half Europe being fought for. It is believed that the attitude and ambitions of Russia portend an interference by that power which will of a certainty excite the resentment of Great Britain, and it may be, of Austria, and thus provoke war on a large scale. Russia is, of course, not only a bear, but a bugbear, to this country, and, consequently, the Russophobists may be in a state of unnecessary ferment. Yet, as I have briefly stated, such are the views which are propounded almost universally just now. In the meantime we await the development of events, and are joining in one great and strong cry in denunciation of the hellish Turkish atrocities in Bulgaria. The special correspondent of the London Daily News (an American Celt, Mr. McGahan), who first made public these truly diabolical crimes—horrors that are totally unworthy even of Dahomey—is still sending able and evidently accurate reports from the scene of war, and this country is very rapidly coming to the conclusion that the Turk must very soon be expelled from Europe. At present his rapacity and lust, his ignorance and fanaticism, his idleness and obstructiveness, are constant inherent sources of danger, and when any of these sufficient causes is intentionally or accidentally made prominent, all Europe is set a-gog, and has before now been set ablaze. I think this country does not ask too much when it asks to be freed from any further contingent liabilities on behalf of the descendants of Osman.

THOMAS VAUGHAN &amp; CO.

have at length "gone into liquidation," which is nowadays anything but a severe phrase. The result is what many have been anticipating amongst so many creditors, any one of whom being dissatisfied and having a claim for over £50 might precipitate the thing by filing a petition. The partners in the firm are Thomas Vaughan and George Needham, and the petition describes them as iron-masters, iron manufacturers, ironstone and coal mine owners, and bolt and nut manufacturers, carrying on business at Middlesboro', Clay Lane, South Bank and South Skelton, Yorkshire; Bishop Auckland, Wharfedale, Woodhouse Close and South Medowsley, Durham, and in Canon Street, city of London. The liabilities were stated to be about £1,000,000, and the solicitor who made the application for the appointment of a receiver said the wages payable to the workmen, even now, were £4000 weekly. As I have stated on a former occasion, the assets are £1,250,000, but in the present state of trade it would be almost impossible to realize them in a satisfactory manner. Under these circumstances it appears highly probable that the concern may be converted into a "limited," which, with good management and patience, might do well when trade does revive. Mr. Vaughan, I may say, is the only son of the late John Vaughan, who has been called "the commercial discoverer of Cleveland," and who died eight years ago, leaving his son Thomas personal property worth more than half a million of money, besides landed, &c., property worth as much more. All this has gone somewhere in the interval, and now little remains beside the worth of the iron works and collieries. Where the balance has gone to will, in all probability, transpire at the meeting of creditors, to be held September 21st. These meetings of creditors, I may first remark, are usually heavy farces, and, as a natural consequence, debtors may do what they like and never be called to account. Other than this,

## FURTHER GREAT FAILURES

have occurred, and are daily occurring with a somewhat alarming persistency. Messrs. Swan, Coates & Co., who have four blast furnaces at South Bank, near Middlesboro', and ironstone mines at Skinningrove, Cleveland, have resolved to file a petition. Their liabilities are £250,000. The Lokenby Iron Company, with four blast furnaces at Coutham, has stopped, with liabilities set down at about £300,000. Other failures on a smaller scale in Cleveland bring up the total losses of the district to about £2,000,000 sterling. Outside Cleveland, the Demon of Distress (to speak in Carlyle's language) has been actively at work. Mr. I. B. Walker, ship builder, Barrow, is down for £40,000. At Sheffield, Messrs. G. W. Dyson and G. E. Hodgkinson, steel forgers, have petitioned, with about

£40,000 worth of debts. In London, F. C. & J. Goodfellow, book sellers, have "gone down" for £12,000. At Leeds, Mr. J. Wilson, glass manufacturer, has petitioned, owing about £40,000. At Dewsbury, James Wormald & Sons, contractors, have failed, owing £50,000. At Bradford (York), Messrs. Gurney & Wilson set down their liabilities at £54,125, whilst at Oldham the following failures have taken place during the week: John Winterbottom, stationer, £32,770; James Winterbottom, jeweler, £34,000; Thomas Marsden, builder, £7052, and Messrs. Henry and Abel Cunliff, wool staplers, £47,582. A Leeds firm of stockholders have succumbed with a nominal indebtedness of £39,140, but I suppose this will be an exaggeration.

## SOME FEW EXPLOSIONS

of a material, not financial, nature, have occurred during the week, involving loss of life and much destruction of property. At Hull, a boiler exploded, killing Thos. Rose on the spot, scalding the owner of the premises and his three sons very severely, and wrecking the place very effectively. At the Monkland Iron Works, Scotland, a boiler also blew up with such force as to wreck a two-story building and kill Henry Thompson (the engineer), beside injuring several other persons. At Edinburgh, a glove cleaners' establishment was run down by an explosive compound, two female assistants being badly burned. At Bristol, Mr. Wm. Coffin—suggestive name!—has been fined for keeping 10,000 cartridges, a few barrels of powder and other "mixtures" in a crowded neighborhood.

## THE WEEK'S FIRES.

however, more than compensate for our poor display in the matter of explosions. It is often thus with us. When we fall short in one respect we experience abundance in another. As Artemus Ward expressed it, when we are tired of bacon we can go to "cabbage," and when that succulent vegetable palls upon the satiated palate, then can we lie back to deceased pig and feast upon the porcine product! But, as to the fires: At Edinburgh, the Caledonian distillery exploded slightly and then inflamed greatly, a man in charge being burnt to death, and heavy damage done. At a rural spot called Chipping Warden, a man upset a benzoline lamp, wherefrom a blaze was kindled which was not satisfied until it had totally destroyed four entire houses and part of a fifth. At Paisley, part of the foundry of Messrs. Craig was burned, the damage being estimated at £10,000 or thereabouts. At Balley, the woolen manufactory of Messrs. Jubb was wholly "conflagrated," the damage being £50,000. At Wenn, Cornwall, two houses were burned down. At Highgate, London, the chandelier factory of Mr. Ford was nearly destroyed, and a number of firemen injured, owing to the fall of a great length of wall.

## ONLY ONE RAILWAY ACCIDENT

of any moment has taken place during the week—a fact which does not say much for the lion's providers—the careless pointsmen, the groggy driver, the negligent guard, &c. The solitary accident was brought about by the mail train from Carlisle to Scotland running into the debris of a goods train which had broken down and fouled both lines of rails. A number of people were hurt.

## HEAVY RAILWAY EXPENDITURES

are now going on in this country. The Great Northern is extending into Derbyshire at a cost of over £2,000,000. At Derby, the Midland is spending over £500,000 in the erection of carriage shops, &c., beside £1,500,000 on various extensions, sidings, &c. At Middlesboro' the North Eastern has spent £127,497, up to June 30th, on new docks. At Ferry Hill the same company is expending £40,000; at West Hartlepool, £257,000; at Monkwearmouth Junction, £253,000; at Byker and Percy Main, £227,000; at South Shields, £54,000; at Seaburn and Haver, £36,000, and at York the new central station is costing £370,000. These are independent of many minor projects now in hand.

## SCOTCH PIG IRON

is, at the moment, a trifle better than it has been, but I presume any real improvement is out of question with 51,905 tons in Connal's stores, and a duller state of trade than ever to contend with. There is no change in freights, and the number of furnaces in blast is 115, or within one of the number blowing at the same date of last year.

Messrs. James Watson & Co., Sept. 1st, say: "The Scotch pig iron market was buoyant on Monday, business being done from 55/10 to 56/3, cash; on Tuesday it declined to 55/10, and since then the price has gradually improved to 56/1 1/2, cash, and 56/3 one month open, closing buyers at the latter figures, sellers three half pence higher. Shipments last week were 10,550 tons, against 10,332 tons in the corresponding week of 1875."

	No. 1.	No. 3.
G. M. B. at Glasgow	56/6	54/6
Gartsherrie	56/6	54/6
Coltness	56/6	54/6
Summerlee	56/6	54/6
Langloan	56/6	54/6
Carnbroe	56/6	54/6
Calder, at Port Dundas	56/6	54/6
Glenbrook, at Ardrossan	56/6	54/6
Eglington	56/6	54/6
Dalmellington	56/6	54/6
Shotts, at Leith	56/6	54/6
Kinnell at Bo'ness	56/6	54/6

Messrs. John E. Swan & Bros. (limited) figures are somewhat different, thus:

Glasgow Brands.	Furnaces Blowing, 115	Furnaces Blowing, 115	Furnaces Blowing, 115	Furnaces Blowing, 115	Prices.
					No. 1, No. 3, No. 4
Gartsherrie	13	3	16	63/6	55/6
Coltness	12	3	15	63/6	55/6
Summerlee	6	1	8	59/6	54/7
Langloan	6	0	8	59/6	54/7
Govan	4	0	5	56/6	54/7
Calder	4	0	7	56/6	54/7
Shotts	5	0	6	56/6	54/7
Carnbroe	5	1	6	56/6	54/7
Wishaw	2	1	3	56/6	54/7
Monkland	3	0	3	61/6	54/7
Chapelhall	3	0	3	61/6	54/7
Clyde	5	0	6	57/6	54/7
Quarter-Clyde	4	0	5	56/6	54/7

\*L. o. b. Glasgow, 1/ per ton, extra.

Glasgow Warrants, 3-5 No. 1; 2-5 No. 3, g. m. d., 56/2.	
WEST COAST BRANDS—f. o. b. Ardrossan.	

Glenbrook	7	2	9	68/	55/6
Ardrossan	4	2	8	68/	55/6
Eglington	6	2	8	68/	55/6
Luzar	4	0	4	55/6	54/6
Muirkirk	3	0	4	55/6	54/6
Portland	3	0	4	55/6	54/6
Dalmellington	6	2	8	55/6	54/6

## TRADES OF SHEFFIELD.

In hardly any department of the iron, steel, or hardware trades has there yet been any change of importance during the week. Pig iron remains very quiet, owing to the dull demand and the heavy stocks held in Scotland, Cleveland, and elsewhere. There is a tolerable inquiry for special foundry goods for colliery and iron works, or engineering purposes, and a slightly better call for some classes of constructive ironwork, but when these are enu-

merated the list of favorable items in the ordinary trade is exhausted. At the larger establishments there is a fairly good production of boiler plates and ship plates, both of steel and iron, not to mention armor plates, but for miscellaneous railway requisites the call is exceedingly limited. A few lots of steel rails continue to be worked off, but it is an admitted fact that in nearly every instance the profit is somewhat problematical. The Bessemer plant at the leading works, however, is fairly well employed in the output of ingots for various purposes, some being made into rails, axles, &c., and the balance sent out of the district as forgings. Rail ends are being made use of by the cutlery manufacturers for blade making purposes, "middles" suitably sawn up for re-rolling, realizing from 26/10 to 27/10 per ton. By the use of this material, which is growing in favor, an additional discouragement is put before the cast steel manufacturers, who are at the present time suffering most severely from the current depression of trade. Even the highest classes of cast steel move off very slowly, and commoner descriptions can hardly be got rid of on any terms. The American market is practically closed, only fine qualities, namely, clock spring sheets, bevel sheets and plates, special tool steel, axe, hatch and plow plates, being now sent to the Atlantic, and those in exceedingly limited quantities.

The file trade has grown rather brisker during the last few weeks, and I hear of a few good orders having been placed in the hands of a couple of leading edge tool houses.

The annual report of the directors of the Sheepbridge Coal and Iron Company, Limited, is a document of much interest, the concern being one of the largest in this part of the country, the capital being £554,000, of which £330,000 is already called up. The directors say, "they regret that they have again to report a year of unrelieved gloom in all the branches of the company's business. The falling off in demand has continued throughout the year undiminished by the rapid and continuous reductions in prices, culminating, so far as the iron trade is concerned, in a depth of depression unprecedented in its history. Contracts secured in the previous year enabled your directors to make a distribution on account of dividend in February last, at the rate of 10 per cent. per annum, but during the second half of the business year it has been impossible to secure orders to keep the works in operation at remunerative prices. Owing to the strike of the colliers, lasting over eight weeks, almost all of the company's works were at a standstill during the last quarter, entailing a heavy loss and practically making the year one of six months." They then proceed to remark that wages, especially when taken in connection with the shortened hours of labor, remain at a scale totally incompatible with the existing state of trade. The balance-sheet, however, they think satisfactory under the circumstances, showing as it does a clear profit of £18,883, after making all suitable allowances for bad debts, depreciation, &c., and without touching the reserve fund of £100,000. The dividend recommended is at the rate of 8 per cent.

In the razor and scissors branches of the cutlery trades I hear of a trifling change for the better but the spring knife and table knife departments are still dull and unprofitable.

## BIRMINGHAM AND STAFFORDSHIRE TRADES.

There has been no change of any importance during the week. Several of the larger blast furnaces in the district have been blown out, but in other respects trade rules as dull as heretofore and prices are unchanged.

## WALES AND MONMOUTHSHIRE.

The coal trade of these parts is still good, last week's exports having been 75,000 tons of coal from Cardiff, 15,000 from Swansea and 11,000 from Newport, beside 5000 tons of patent fuel from Cardiff and 3000 tons from Swansea. Of iron, Cardiff sent off 824 tons, whilst 6177 tons went from Newport. Of the latter total 1500 tons went to Quebec, 1400 to Montreal and the remainder to European countries and Port Natal. Iron rails are being done at £5. 5/6, or a shade lower.

## THE METAL MARKETS.

have been very steady during the week, prices having been upheld.

The Mining Journal says: "Copper.—Chili bars have been in good demand, and prices are firmly maintained. At one time the market was animated, and assumed a strong upward tendency, with every prospect of prices rapidly advancing, but since the failure in carrying out the negotiations for peace there has been less confidence manifested in any immediate general improvement, and buyers, consequently, are not so eager to speculate for a rise; the price, therefore, may get gradually easier, but for every pound that it drops now it will advance two whenever peace is proclaimed and permanently established. Lead.—The market has undergone very little change. Prices are, perhaps, if anything, a shade easier, but sellers are firm at quotations. Spelter.—Silesian spelter, stock in London, 70 tons. Hard in fair request. Australian ingot at public auction bought in at £10. 10/ to £20. Zinc has realized £27 sale terms. Quicksilver is still quoted £8, but orders are limited. Tin Plates.—Makers cannot very readily obtain the advance they are quoting, and a fair ordinary coke is obtainable at 19/6 per box. Wasters of ordinary dimensions are in request, but sellers have few to dispose of, and require a full price. Tin.—The market has continued remarkably steady and uniform in price, and the bulk of the sales that have transpired have been reported at £72 to £72. 10/ for Australian and Straits. The future supply of Straits may be considerably interfered with, owing to the rate of exchange in Penang, bringing the price dearer than that now ruling here. It will prevent any orders from England, and, consequently, the Exchange keeps stationary, there will probably be a diminished importation."

Mr. James Hallows (Liverpool) reports: "English copper in moderate demand. The fluctuations in the price of Chili have been slight. This week there is more inquiry, and prices have advanced 30/ per ton, g. o. b. being now £71. 10/ per ton, buyers. The market closes quietly steady. Tin steady. Silver, after touching 54d., suddenly declined to 51 1/2d.; since has advanced, and is to-day 51 1/2d. per oz. I do not look for a return of the late low rates, but rather for a further improvement, as there is no stock here."

Latest Liverpool prices (open) are:

Iron: f. o. b. in Liverpool, per ton.					
Merchant bar	6	12	6 1/2	6 1/2	5
Merchant bar, in Wales	6	2	6 1/2	6 1/2	5
Staffordshire	7	5	0 1/2	9 1/2	0
Hoop	9	10	0 1/2	10	0
Sheet	9	10	0 1/2	10	0
Nail rod	7	10	0 1/2	9 1/2	0
Bar, best crown	7	5	0 1/2	8 1/2	0
Boiler plates	9	15	0 1/2	10	0

Tin Plates: f. o. b. in Liverpool, per box.

Charcoal, I. C.	1	5	0 1/2	1	7
Coke, I. C.	1	0	0 1/2	1	2

Copper: Delivered in Liverpool, per ton.

Bolt and Sheathing	84	0	0 1/2	85	0
File	78	0	0 1/2	0	0
Tough cake	78	0	0 1/2	0	0
Best selected	78	0	0 1/2	0	0

I take the following from the Liverpool correspondence of Messrs. Harrington, Horan & Co., Aug. 31: "After the dispatch of the last mail to

Chili the price of copper dropped until £70 was again touched for bars, the dull feeling being augmented by advice of Chili charters being 2200 tons for the first half of August, consisting of 1600 tons bars and 50 tons regulus for England, and 550 tons bars for the Continent, subsequently there was some very good buying, and prices ran up to £71. 10/ to £72 per ton, at which rates market closes sellers. During the fortnight about 2600 tons bars changed hands at £70 to £72 per ton, and 66 tons Corocoro Barilla at 15/6 per unit. Bar silver suddenly receded from 53 1/2d. to 51 1/2d., and has since fluctuated, but 51 1/2d. is the price to day. At the Swansea sale on the 29th instant 1216 tons copper ore, principally Newfoundland and Union ore, average produce 8.1-16 per cent. realized 13/ per unit. Quotations are:

Chili bars	To Day.	Aug. 31, 1875
" ingots	£71. 10/ to £73	£72. to £74
" ore and regulus	13/9 to 14/3	16/9 to 17/3
Corocoro Barilla	15/6	18/3
Chili bars	Aug. 31, 1874.	Aug. 31, 1873.
" ingots	£77. 10/	£84 to £86
" ore and regulus	£88	£95
Corocoro Barilla	15/ to 15/9	16/6 to 17/
Barilla	16/9	18/6

ARRIVALS HERE DURING THE FORTNIGHT OF WEST COAST, S. A. PRODUCE.

	Ores.	Regulus.	Bars.	Ingots.
"Soraia," from Valparaiso	563	56	950	
"Dorford," " "	812	100		
"Epsilon," " "	50			
"Advancement," from Valparaiso				
At Swansea:				
"Glen Udal," from Carrizal	768			
"Cornet," from Tocopilla	135	465		

"Stocks of copper (Chilian and Bolivian) in first and second hands, likely to be available, we estimate at:

	Ores.	Regulus.	Bars.	Ingots.
Liverpool	545	4,013	8,472	378
Swansea	545	4,013	8,472	378
Total	545	4,013	11,779	378

Representing about 13,863 tons fine copper, against 13,580 tons 15th instant; against 13,459 tons fine copper Aug. 31, 1875; against 17,300 tons fine copper Aug. 31, 1874; against 21,900 tons fine copper Aug. 31, 1873. Stock of Chili copper in Havre, 5073 tons fine. Stock of Chili copper in London, 9738 tons fine. Stock of foreign copper in London, chiefly Australian, 4359 tons fine. Tin.—Market steady at £72 to £72. 10/ for Straits and Australian, £77 for British, and £63 for Peruvian. Lead.—A good business doing at £21. 15/ to £22 for English, and £21. 2/6 for Spanish. Spelter.—Market steady at £23 to £23. 5/ for ordinary Silesian brands."

## The Knox Fluter.

We illustrate herewith Mrs. Susan R. Knox's latest improvement on her original invention, the well known Knox fluting machine. This machine dispenses entirely with the old style sprag, which prevented the free and unobstructed passage of the fabric when a heavy pressure was required. In its stead is substituted a very pretty steel bow spring, which is regulated by a thumb screw, giving a general and uniform bearing on the flutes, and any tension required. In addition to the tension, is



the improved catch on the top of the lever, which is a simple contrivance, and readily adjusted in separating the rolls to admit or release the material. These machines are handsomely finished, and on the base of each an excellent photograph of Mrs. Knox is shown. They are placed on the market at \$4.15 each, for 6 inch, less discount 30 and 10 per cent. Sargent & Co. are agents for these goods in this city.

## Hints on Gas Burners.

From a letter of Mr. Geo. McMillan, to the Liberal Democrat, we take the following, which answers a great many questions about gas burners that are constantly arising:

About twice or three times a year canvassers come around trying to deceive the public with some kind of patent gas burner, in which it is claimed that all the gas is thoroughly consumed, a great increase in illuminating power attained, and a saving of 25 to 50 per cent., as the case may be, caused by its use. Many burners that have no superior merit whatever are sold at prices varying from 30 cents to \$1.50 each, in this way.

Invariably they are fixed aperture, but more commonly called check burners. To illustrate the working of this principle of burner, let us suppose one of them to be adjusted to consume five feet of gas per hour, under pressure of 25-10ths (gas pressure is always represented in inches of water), and let it be reduced to 9-10ths pressure, which not unfrequently happens, and the burner will deliver only about half the first named quantity, and since it is well known that the intensity of flame increases with, but in greater ratio than, the quantity of gas used, it will develop probably one-fourth of the original light, which will be altogether insufficient for the requirements of the consumer, and with most of these patent burners has positively no remedy left, but a resort to lamps or candles, since he cannot change the adjustment without the aid of proper tools, notwithstanding that plenty of gas enters his premises.

Now, since all fixed orifice burners are exactly alike in principle and in action, though many of them differ materially in mechanical

construction, the discharge always varying with every change of pressure in the street mains, which sometimes is very considerable during the evening hours of burning, it will be easily seen that the high priced burner of this class is no more economical than the low priced one, and that either kind will accomplish no more than can be obtained by packing a little cotton wool inside of a common brass or iron pillar, and at no greater expense to the consumer, than the trouble of unscrewing the pillar or burner from the fixture, and screwing it back again. However cheap the first cost of this class of burners, they are expensive in the end, and will waste gas to the amount of many times their cost in a short time. A good gas burner is of the highest importance to the consumer, because the work that shows on the index of his meter is all done here. The perfection of the combustion depends altogether upon the burner, and, if not properly arranged, will permit some of the gas, which is already recorded on the face of the meter, to pass off as smoke and soot; or the admission of too much air will cause great heat instead of producing light, as may be seen in an exaggerated degree in an atmospheric or Bunsen burner. Every oil lamp or candle is simply a small arrangement for the manufacture and consumption of gas. In a common candle the tallow is drawn to the burning wick, by capillary attraction, and quickly converted into gas and burned. The hydrogen in the gas is the heat giving constituent, and the carbon the light producing element, and the longer the latter is held in an incandescent state in the flame, the more perfect will be the combustion; and the burner which has the best adjusted supply of atmospheric air to the flame will do this the best, and will develop the greatest light from the least quantity of gas. In fact, the chief means of obtaining the maximum illuminating power from gas is to insure an exactly adequate supply of air to the gas flame.

The greater the velocity with which gas issues from a burner, the more air is the flame brought in contact with, and it is apprehended that too much air is more frequently a source of waste to the consumer than an insufficient supply. The destructive effect of excessive pressure is at once apparent in the paleness of the flame, as compared with the light obtained from the same quantity of gas burnt under proper regulation, and in this connection it may be well to say that the consumer cannot be too thoroughly impressed with the urgent necessity of burning his gas under low pressure, if he would secure to himself good results. With an Argand burner the quantity of air is regulated by the glass chimney surrounding it, and the best burning point immediately precedes the smoking point, while in the case of flat flame burners the supply wholly depends upon the pressure at which the gas issues from the tip, and should always be the lowest possible point that will develop a properly shaped flame. When the latter class of burners are employed to consume common



## New Custom House Regulations.

The following in regard to the new Custom House regulations is of interest. The date is the 19th:

The Acting Secretary of the Treasury has issued a circular to collectors of customs, declaring that hereafter Article 640 of the General Regulations of 1874 will be understood to require all appraised merchandise transported in bond to be either corded and sealed or placed in cars secured by customs locks or seals. Such bulky and unwieldy articles as can be transported only on platform cars or the decks of vessels need not be corded and sealed, provided the manifests for the same describe the articles with sufficient accuracy to enable customs officers to identify them at the port of arrival.

He has also issued a circular amending the regulations governing the transportation of merchandise to, from and through the British Possessions of North America, so as to provide that merchandise of domestic origin, duty paid or free of duty, may be transported from one port to another of the United States over the territory of the Dominion of Canada, with the consent of the proper authorities, by routes duly designated and bonded for such purpose. Cars must be specially appropriated for such transportation, placed under the customs seal by an officer of the customs at the port of departure in the United States, and remain thus sealed until they shall have passed through such foreign territory and again arrive in the United States. Collectors of customs on the frontier may, however, allow railroad cars laden for transit through Canada to remain unsealed when such cars contain perishable merchandise or valuable animals requiring the special care of attendants during transit, and when such animals or merchandise are capable of identification by specific description in the manifest of the car containing the same. In all other cases when it is desired to transport live stock or other merchandise through the Dominion of Canada in unsealed cars, the collector will detail a regular or temporary inspector of customs to accompany such cars during the transit, the expense of which service shall be paid by the party at whose request the same is rendered.

All bulky merchandise which is incapable of being put in sealed cars may be transported on platform cars.

**Solar Heat and Sun Spots.**—The present season has been extraordinary in many respects, but the intensity of heat in July and August has signalized it as quite without a parallel in meteorological records. The Boston *Journal of Chemistry*, in speaking of this subject, says that the heat has been intense not only in all parts of our country, but in Europe as well. The absence of sun spots, which has been noticed since the last week in March, may have some bearing upon this excessive evolution of solar heat. If large areas of the sun's disk, which are usually to some extent eclipsed, have this season been constantly luminous, it would appear plausible to connect sun spots with solar energy and with range of temperatures upon our planet. They have not, however, we believe, been regarded as capable of producing planetary disturbances of this kind. But we know that the nature of these spots is quite imperfectly understood, and although great light and heat energy exists in all parts of them, even in the darkest, still this may not prove that they have no cooling influence. A long series of careful observations can alone settle this point—a series much more extended than any yet undertaken. The immense activity at present in the study of solar physics will undoubtedly soon greatly enlarge our knowledge upon the possible connection which may exist between terrestrial heat and sun spots.



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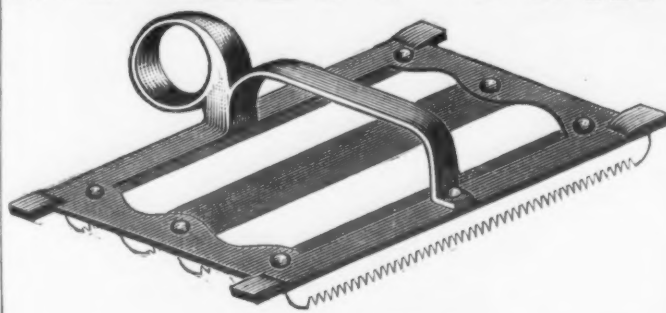
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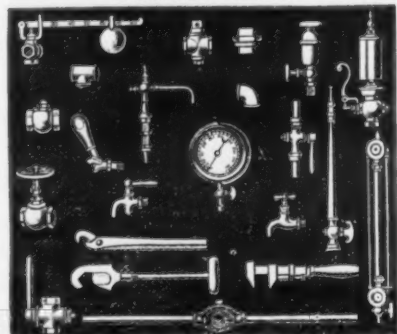
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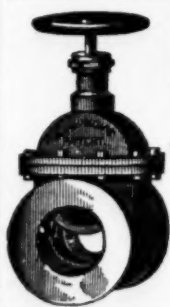
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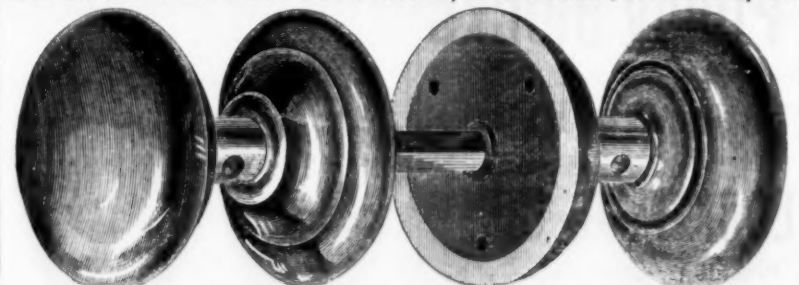
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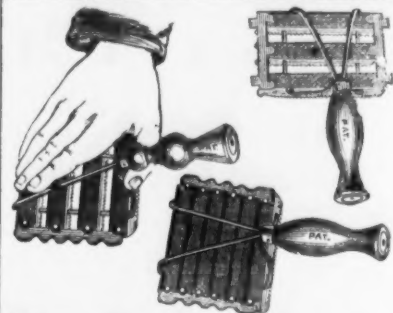
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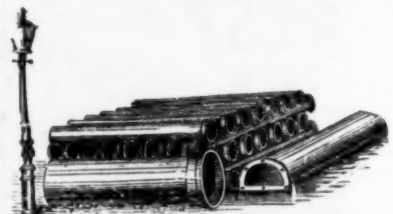
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# The Iron Age Directory

## and Index to Advertisements.

<b>Alarm Whistles and Speaking Tubes.</b>	<b>PAID.</b>
Fredericks C. A., 85 Fulton, N. Y.	31
Ostrander W. R., 19 Ann, N. Y.	11
<b>Animal Poles.</b>	
Bishop & Benedict, Berea, O.	32
<b>Angels, Manufacturers of.</b>	
Fisher & Norris, Trenton, N. J.	31
<b>Angers, Hite, etc., Manufacturers of.</b>	
Clark Wm. A., Westville, Conn.	13
Milwaukee Mfg. Co., Milwaukee, Wis.	32
The Conn. Valley Mfg. Co., Waterbury, Conn.	8
The Douglass Mfg. Co., 62 Reade, N. Y.	9
<b>Angles and Wedges.</b>	
Amos & Sons, 100 Chambers, N. Y.	4
<b>Arms, Edge Tools, etc., Manufacturers of.</b>	
D. R. Barton Tool Co., Rochester, N. Y.	10
James M. H. & Co., Cohoes, N. Y.	10
Ten Eyck & Mfg. Co., Cohoes, N. Y.	29
<b>Axes, Springs, etc., Manufacturers of.</b>	
Brown D. Arthur & Co., Fisherville, Concord, N. H.	12
Clark, Smith & Co., 100 Chambers, N. Y.	12
Cook R. & Sons, Winsted, Ct.	12
Spring Perch Co., Bridgeport, Conn.	10
Tomlinson Springs, 145 N. 3d, Phila.	12
Bochius Guy C. & Co., Brooklyn, E. D.	31
<b>Band Saws and Tools for Brazing &amp;c., Importers of.</b>	
Central George & Son, 39 W. 4th, N. Y.	12
<b>Barn Door Hangers.</b>	
Moore S. H. & E. Y., Chicago, Ill.	29
<b>Bed Screws, Makers of.</b>	
Shelton Co., 100 Chambers, Conn.	30
<b>Bellows, Manufacturers of.</b>	
Churchward, Joseph, Buffalo, N. Y.	32
Newcomb Bros., 366 Water, N. Y.	32
Scott Geo. M., Chicago, Ill.	32
<b>Bells.</b>	
Baltimore Bell and Brass Works, 33 and 35 Hol-	
liday, Baltimore, Md.	12
Williams E. A. & Son, 107 Plymouth, Jersey City,	
N. J.	12
<b>Bells (Clacks).</b>	
Bevin Bros. Mfg. Co., Easthampton, Conn.	29
<b>Belts, Stoppers.</b>	
Trucker & Rogers, Indianapolis, Ind.	30
<b>Blind Hinges.</b>	
The Holbrook Patent Blind Hinge Mfg. Co., Water-	
town, N. Y.	6
<b>Belting, Leather, Makers of.</b>	
Alexander Bros., 412 N. 3d, Phila.	31
Armstrong Wm. F. & J., 3d, Phila.	31
Foreman Wm. F. & J., 3d, Phila.	31
<b>Belting, Rubber.</b>	
Evickson E. & Co., Philadelphia, Pa.	20
<b>Bird Cages, Makers of.</b>	
Lindeman T. & Co., 254 Pearl, N. Y.	10
Maximilian John, 100 Chambers, N. Y.	10
Oborn Mfg. Co., 79 Bleeker, N. Y.	10
<b>Blind Hinges.</b>	
Minerva Falls Mfg. Co., 74 Chambers, N. Y.	21
<b>Blowers, Makers of.</b>	
Forrest Portable Forge Co., Philadelphia.	35
Forrest S. C. & Co.	34
<b>Bolts (Screws).</b>	
Samuel Hill & Son & Co., 239 W. 10th, N. Y.	13
<b>Borax.</b>	
Prater Chas. & Co., New York.	6
Pope Thomas & Co., 254 Pearl, N. Y.	4
<b>Brass Butts, Makers of.</b>	
Tiebout W. J., 240 Pearl, N. Y.	6
<b>Brass, Manufacturers of.</b>	
Amos & Sons, 100 Chambers, N. Y.	4
Baltimore Bell and Brass Works, 33 and 35 Hol-	
liday, Baltimore, Md.	12
Benedict & Voss, 99 Chambers, N. Y.	12
Davies John & Sons, 100 John, N. Y.	2
Robins Brothers, 100 Chambers, N. Y.	2
Robins Mfg. Co., 230 Pearl, N. Y.	2
Manhattan Brass Co., 43 Reade, N. Y.	2
Miller Edw. & Co., 100 Chambers, N. Y.	2
Plum & Atwood Mfg. Co., Chambers, N. Y.	2
Sevill Mfg. Co., 421 Broome, N. Y.	2
The Wilcox Mfg. Co., 30 Barclay, N. Y. and 96 John,	
Bridgeport, Conn.	2
Waterbury Brass Co., 92 Beekman, N. Y.	2
<b>Brick Presses, Makers of.</b>	
Carroll E. L. & Co., Germantown Ave., Phila.	24
<b>Bridge Builders.</b>	
Mosley Iron Bridge and Roof Co., 5 Day, N. Y.	24
Leitch Bridge and Iron Works, Rochester, N. Y.	10
<b>Brushes (Wheel).</b>	
Freder P. M., 117 John, N. Y.	10
<b>Butcher and Meat Scales, Manufacturers of.</b>	
Wilson John, Sheffield, England.	29
<b>Butcher's Scales.</b>	
Forrester Chas. & Co., Rochester, N. Y.	29
<b>Butts and Hinges.</b>	
American Spring Butt Co., 32 Beekman, N. Y.	26
Sample, Birge & Co., 100 Chambers, N. Y.	21
Union Mfg. Co., 38 Chambers, N. Y.	7
<b>Cann Opener.</b>	
Dunlop J. S., 100 Chambers, N. Y.	7
<b>Carriage Bolts, Makers of.</b>	
Townsend, Wilson & Hubbard, Phila.	20
<b>Carriage Hardware, Makers of.</b>	
Smith H. D. & Co., Plantville, Ct.	13
<b>Carriage Springs.</b>	
Beck John H. & Co., Newark, N. J.	10
<b>Car Wheels, etc., Manufacturers of.</b>	
Taylor Iron Works, High Bridge, N. J.	6
<b>Casters (Furniture).</b>	
Toiler John, Sons & Co., Newark, N. J.	26
<b>Chemical and Physical Instruments.</b>	
Hall & Harbison, 100 Chambers, N. Y.	16
<b>Chisels, Manufacturers of.</b>	
Buck Bros., Millbury, Mass.	8
The Douglas Mfg. Co., Chambers, N. Y.	9
<b>Cables Lines, (Galvanized Wire Strand).</b>	
Lowder A. B., 43 Jay, N. Y.	36
<b>Cent. Meters of.</b>	
Lehigh Valley Coal Co., cor. Canal and Church,	
N. Y.	7
Pardee A. & Co., 111 Broadway, N. Y.	7
The Hookless Coal Co., Jersey City, N. J.	7
<b>Coal Vases.</b>	
Jewett John C. & Sons, Buffalo, N. Y.	10
Sidner Bros., Buffalo, N. Y.	27
<b>Coal Hods, Manufacturers of.</b>	
Easterbrook Wm., 31 Cherry, Phila.	24
John C. Smith & Co., Buffalo, N. Y.	10
Shelton Sheppard & Co., Buffalo, N. Y.	10
<b>Coils and Scales Mills.</b>	
Lane Brothers, 100 Chambers, N. Y.	6
Enterferre Mfg. Co., Philadelphia, Pa.	6
<b>Coal Chains.</b>	
Union Chain and Cable Co., Pittsburgh, Pa.	10
<b>Compass and Dividers, Manufacturers of.</b>	
Bemis & Call Hardw. & Tool Co., Springfield, Mass.	12
<b>Compound.</b>	
Hornbostel Chas., 56 Broadway, N. Y.	22
<b>Cooper's Tools, etc., Dealers in.</b>	
D. R. Barton Tool Co., Rochester, N. Y.	26
Little Chas. E., 100 Chambers, N. Y.	24
<b>Corn Huskers.</b>	
Chambers & Quinlan, Decatur, Ill.	10
<b>Corrugated Iron.</b>	
Mosley Iron Bridge and Roof Co., 5 Day, N. Y.	24
<b>Cotton Gin Feeders, Manufacturers of.</b>	
The Brown Cotton Gin Co., New London, Conn.	34
<b>Crackles, Manufacturers of.</b>	
Stow, Wile & Co., 100 Market, Phila.	31
<b>Cutlery, Manufacturers of.</b>	
Cassell I. N., Fredericktown, O.	20
Hutchinson, Sons, Bridgeport, Conn.	20
Lawrence Curry Comb Co., 323 A Avenue, N. Y.	22
<b>Cutlery, Importers of.</b>	
Baker Hermann & Co., 101 Duane, N. Y.	22
Clawthorpe F. & W., 100 Chambers, N. Y.	11
Frederick J. S., 411 Commerce, Phila.	11
Friedman & Lauterjung, 14 Warren, N. Y.	11
King, Hedges & Co., 100 Chambers, N. Y.	11
Mark Emanuel, 100 Chambers, N. Y.	11
Rogers & Bro., 233 Broadway, N. Y.	11
Ward Adeline, 100 Duane, N. Y.	11
Wilson Hawksworth & Co., 72 John, N. Y.	11
<b>Cutlery, Manufacturers of.</b>	
Burroughs Aaron, 100 Chambers, N. Y.	11
Miller Bros. Cutlery Co., W. Meriden, Conn.	11
Nauvau Cutlery Co., 39 Chambers, N. Y.	11
New York Knife Co., 100 Chambers, N. Y.	11
<b>Door and Gate Springs.</b>	
Quackenbush, Townsend & Co., 30 Reade, N. Y.	30
<b>Door Knobs, Makers of.</b>	
Ornamental Wood Co., Bridgeport, Conn.	32
<b>Dredging, and Makers of Dredging Machines.</b>	
Am. Dredging Co., 198 Delaware, Phila.	35
<b>Drill Chucks, Manufacturers of.</b>	
Fraser & Co., 100 Chambers, N. Y.	31
Lambertine Iron Works, Lamberville, N. J.	31
The Hall & Belden Co., Danbury, Conn.	34
<b>Drilling Machines, Makers of.</b>	
Thorne, Dehaven & Co., Philadelphia.	34
<b>Drop Forgings.</b>	
Bullard & Son, Hartford, Conn.	33
Baker Hermann & Co., 101 and 103 Duane, N. Y.	33
Hammond H. & Co., Hartford, Conn.	33
The Hall & Belden Co., Danbury, Conn.	34
<b>Edge Tools.</b>	
The D. R. Barton Tool Co., Rochester, N. Y.	10
Veerd N. & Co., 100 Chambers, N. Y.	10
<b>Electric Machines.</b>	
Hochhausen W., 134 William, N. Y.	29
<b>Electro-Plating.</b>	
Ernhout & Co., 43 Gold, N. Y.	30
<b>Elevators, Makers of.</b>	
Crane Bros. Mfg. Co., Chicago, Ill.	9
Hoake Machine Co., 299 Cherry, N. Y.	9
Whittier Machine Co., 1176 Tremont, Boston, Mass.	34
<b>Emery.</b>	
Geo. H. Gray & Danforth, Boston, Mass.	29
<b>Emery Wheels, Makers of.</b>	
Brady Mfg. Co., 240 Plymouth, Brooklyn, N. Y.	29
The Union Stone Co., Exchange, Boston.	29
<b>Enamel Plates.</b>	
Leffers Enamel Works, 417 W. 24, N. Y.	4
<b>Engineers, Machinists, etc.</b>	
Henshall James, 1006 Beach, Phila.	28
Moore James, 1006 Beach, Phila.	28
Out & Hauschild, 31 to 6 Passaic Ave., E. Newark,	
N. J.	28
<b>Engines, Steam, Makers of.</b>	
Ervin Chas. W. & Bro., Kensington, Phila.	25
Hartford Foundry and Machine Co., Hartford, Conn.	25
Lovregio & Co., 121 South 4th, Phila.	25
Payne B. W. & Sons, 100 Chambers, N. Y.	25
Shapley & Wells, Birmingham, N. Y.	25
Snyder Ward B., 94 Fulton, N. Y.	25

<b>Englavers.</b>	
Collins Geo. B., 10 Warren, N. Y.	24
Swinton A., 722 Chestnut, Phila.	24
<b>Engravers, Brass, Makers of.</b>	
McNab & Harlin Mfg. Co., 56 John, N. Y.	22
<b>Engravers, Self-Measuring, Makers of.</b>	
Enterferre Mfg. Co., Phila. and N. Y.	30
<b>Files, Importers of.</b>	
Carroll J. & Riley 82 John, N. Y.	28
Flaser Joseph S., 411 Commerce, Phila.	11
Fraser Peter A. & Co., 95 Fulton, N. Y.	8
Moss F. W., 90 John, N. Y.	28
Sanderson Bros. & Co., 16 Cliff, N. Y.	28
Wheeler & Jackson, 92 Chambers, N. Y.	28
<b>Files, Manufacturers of.</b>	
Adamantine File Works, Providence, R. I.	18
American File Co., Pawtucket, R. I.	8
Aurum File Works, 89 Chambers, N. Y.	8
Barnett G. & H. A., 41 and 43 Richmond, Phila.	25
Diston Henry & Sons, Phila.	25
Draper J. I. & Co., Sing Sing, N. Y.	25
Heller & Bros., Newark, N. J.	25
Hiscox File Mfg. Co., West Chelmsford, Mass.	25
Johnson & Bro., 1 Commercial, Newark, N. J.	25
Johns Thos. & Sons, Sheffield.	25
McClafferty & Bro., 172 and 174 N. 4th, Phila.	25
Nicholson File Co., Providence, R. I.	25
Paul Chas. B., Williamsburgh, N. Y.	25
Rothery John & Wm., Mattawam, N. Y.	25
<b>Fire Brick, Makers of.</b>	
Brooklyn Clay Retort and Fire Brick Works, Van	
Dyke St., Brooklyn, N. Y.	24
Hall A. & Sons, Perth Amboy, N. J.	24
Hau A. & Sons, Buffalo, N. Y.	24
Maurer Henry, 418 East 23d, N. Y.	24
Kreischer R. & Son, 58 Goerck, N. Y.	24
Newkumel Phila., 234 and Vine, Phila.	24
Newton & Co., Albany, N. Y.	24
Valentine M. D. & Bro., Woodbridge, N. J.	24
Watson John R., 100 Chambers, N. Y.	24
Wheeler Adam, 183 E. 15th, N. Y.	24
Woodland Fire Brick Co., Woodland, Pa.	24
<b>Flint and Emery Paper and Cloth.</b>	
Bac. & Co., 100 Chambers, N. Y.	3
<b>Fishing Tackle.</b>	
Shipley A. B. & Son, 303 Commerce, Phila.	3
<b>File Cleaners, Makers of.</b>	
The Chambers Space Co., foot of E. 9th, N. Y.	32
<b>Fluting Machines.</b>	
The American Machine Co., 430 Walnut, Phila.	29
<b>Forges, Portable.</b>	
Keystone Portable Forge Co., Philadelphia.	29
Place George, (Hurricane) 121 Chambers, N. Y.	29
<b>Foundries and Molders.</b>	
Sam'l J. Cresswell Jr., 812 Reade, Phila.	6
<b>Foundry Facings.</b>	
Order & Brown, Cherry, N. Y.	4
Paxson J. W. & Co., 514 Beach, Phila.	4
Whitehead Bros., 317 W. 13th, N. Y.	4
<b>Franklin Tires.</b>	
Patterson J. M., Woodbury, N. J.	3
<b>Furnaces, Makers of.</b>	
Richmond & Potts, 119 S. Fourth, Phila.	5
<b>Galvanized Iron.</b>	
Leffers Marshall Jr., 90 Beekman, N. Y.	5
St. Louis Galvanizing Works.	24
<b>Gas, etc., Makers of.</b>	
Edw. Sweeney, 4 Duane, N. Y.	3
<b>Governors.</b>	
James Judson & Son, Rochester, N. Y.	24
State Governor Co., Bethlehem, Pa.	24
<b>Grate Bars.</b>	
Vanderbilt Geo., foot W. 19, N. Y.	4
<b>Grain Cradles and Sifters.</b>	
Semple, Birge & Co., St. Louis, Mo.	31
<b>Grindstones.</b>	
Parker Gilbert, 225 Market, N. Y.	32
Wood Walter R., 233 and 235 Front, N. Y.	29
Worthington & Sons, North Amherst, N. Y.	29
<b>Guns, etc., Makers of.</b>	
Moore's John & Sons, 30 Broadway, N. Y.	22
Windmiller John & Roelker, 31 Reade, N. Y.	16
<b>Hammer, etc., Manufacturers of.</b>	
Emmer Hammer Co., Brooklyn, E. D. N. Y.	13
Hammond H., Hartford, Ct.	13
<b>Hammers, Makers of.</b>	
N. Carolina Handle Co., 79 Reade, N. Y.	5
<b>Hardware Commission Merchants.</b>	
David Sullivan, Montreal, Canada.	24
Grattan & Haines, 113 Chambers, N. Y.	30
Walan, Goulet & Flieger, 33 Chambers, N. Y.	30
Wilson J. Clark & Co., 81 Beekman, N. Y.	30
<b>Hardware Dealers.</b>	
Barker W. C. & Co., Chicago.	12
Betts & Burser, 36 Chambers, N. Y.	24
Joyce, Supplier & Wholesaler, 30 Chambers, N. Y.	24
Quackenbush, Townsend & Co., 30 Reade, N. Y.	30
Shepard Slinger & Co., Buffalo, N. Y.	27
Wilson J. Clark & Co., 81 Beekman, N. Y.	30
<b>Hardware Importers.</b>	
Baker Hermann & Co., 101 Duane, N. Y.	29
King, Hedges & Co., 100 Chambers, N. Y.	29
Van Wart & McCoy, 134 and 136 Duane, N. Y.	11
Harold F. W., 76 Chambers, N. Y.	11
Windmiller Louis & Co., Reade, N. Y.	17
<b>Hardware Manufacturers.</b>	
American Spring Butt Co., 32 Beekman, N. Y.	35
Blake Bros. Hardware, 100 Chambers, N. Y.	35
Garnett Oscar, Newark, N. J.	35
Bislin Philip S., 35 Reade, N. Y.	27
Clark & Co., 100 Chambers, N. Y.	30
Corbin F. & F., 87 Chambers, N. Y.	30
Cowles Hardware Co., Unionville, Ct.	29
Cotnam Mfg. Co., 100 Chambers, N. Y.	30
Hart Bliven & Mead Mfg. Co., 343 Pearl, N. Y.	30
Miller's Falls Mfg. Co., 74 Chambers, N. Y.	21
Parr Geo., Buffalo, N. Y.	21
Pratt & Co., Buffalo, N. Y.	21
Providence Tool Co., Providence, R. I.	13
Sperdy D. R. & Co., Buffalo, N. Y.	13
The Hall & Belden Co., Danbury, Conn.	34
Union Mfg. Co., 38 Chambers, N. Y.	7
Van Wagner & Williams, 32 Beekman, N. Y.	36
Wilson Mfg. Co., Chambers, N. Y.	36
<b>Hardware Specialties.</b>	
Carver John, 233 Monroe, N. Y.	5
Fisher Chas., 39 Thomas, N. Y.	5
Grant & Co., Newark, N. J.	24
Hardy & Co., 102 Elm, N. Y.	24
Jessup & Loring, 1 and 3 Cliff, N. Y.	24
Langdon Mfg. Box Co., Millers Falls, Mass.	5
Semple, Birge & Co., St. Louis, Mo.	31
Snyder & Co., Buffalo, N. Y.	31
Spencer & Underhill, 34 Beekman, N. Y.	2
<b>Holding Engines, Makers of.</b>	
Crane Chas. Mfg. Co., Chicago, Ill.	9
Otis Bros. & Co., 348 Broadway, N. Y.	9
<b>Hoe Ringers.</b>	
Chambers & Quinlan, Decatur, Ill.	20
<b>Horse Nails, Makers of.</b>	
Assable Horse Nail Co., 35 Chambers, N. Y.	30
Northwestern Horse Nail Co., Cleveland, O.	30
Globe Nail Co., Boston, Mass.	29
Platt & Co., Buffalo, N. Y.	27
Putnam & Co., New York, N. Y.	8
<b>Horse Shoes, Makers of.</b>	
Boston Rolling Mills, 17 Battery, Boston.	4
Cambridge Iron Works, 100 Chambers, N. Y.	4
Rhode Island Horse Shoe Co., Providence, R. I.	4
Schoenberger & Co., Pittsburgh, Pa.	4
<b>Hyaline.</b>	
Dudman Richard, 34 Columbia, N. Y.	33
<b>Ice Chills.</b>	
Holten E. J. & Co., 34 Beekman, N. Y.	33
<b>Insurance, Boiler.</b>	
Hartford Steam Boiler Inspection and Insurance Co.	35



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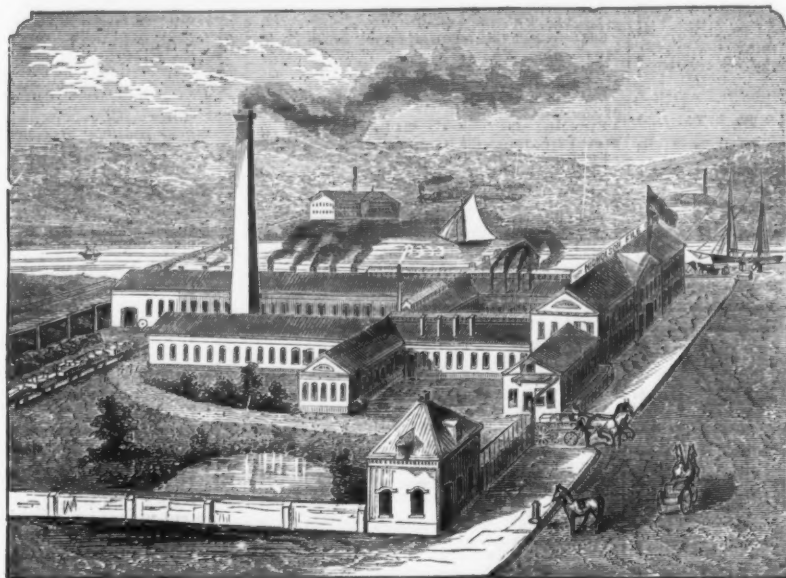
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FOR THE FOLLOWING REASONS:

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ESTABLISHED 1836.

**JOHN R. WATSON,** Perth Amboy, New Jersey,  
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For Rolling Mills, Blast Furnaces, Foundries,  
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The best fire clay from my own Clay Beds at Perth  
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Stones gotten up or labeled in  
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Our Stone are of wood keen  
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Communications should be addressed to the  
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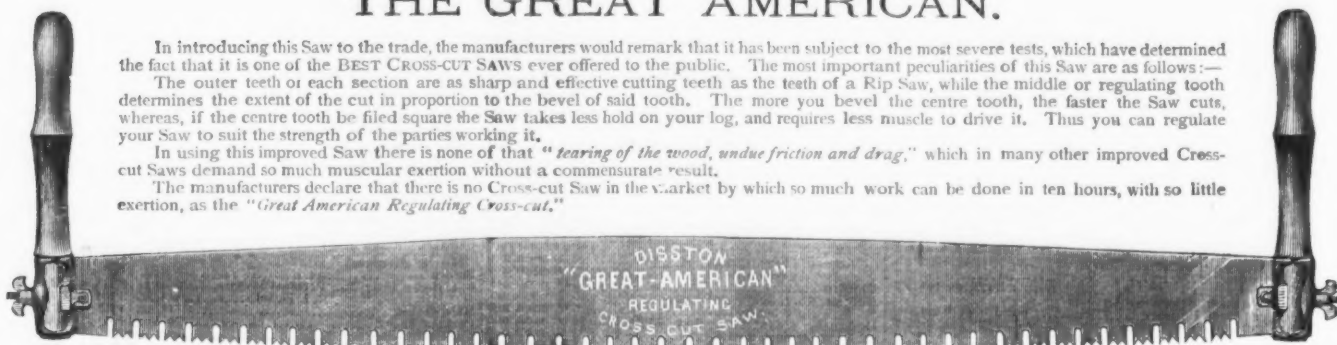
# Keystone Saw, Tool, Steel and File Works.

Front and Laurel Streets, Philadelphia.

## HENRY DISSTON & SONS, Hand, Panel and Rip Saws and Handled Saws OF EVERY DESCRIPTION.

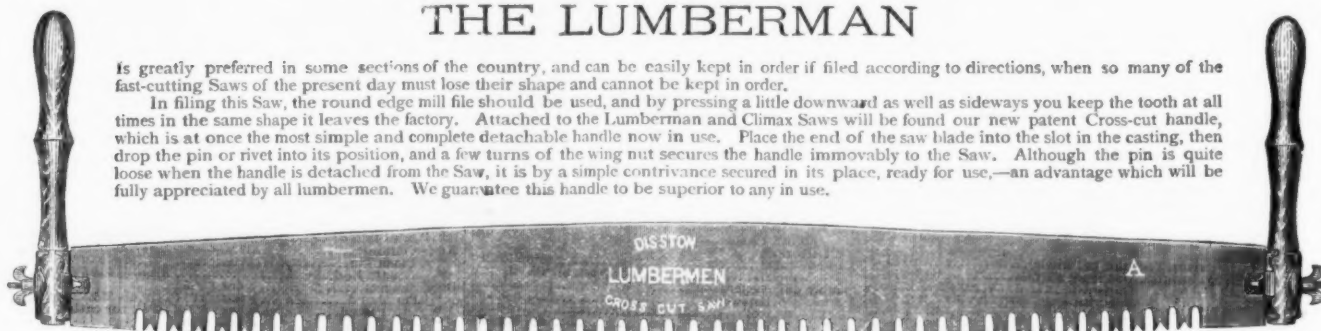
### THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—  
The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.  
In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.  
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "Great American Regulating Cross-cut."



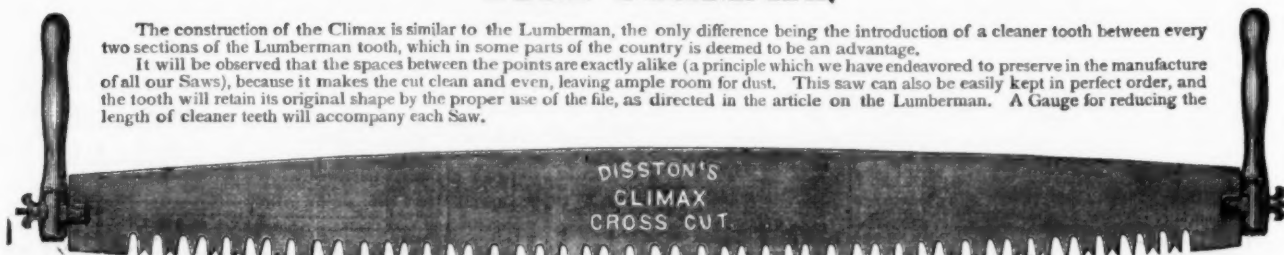
### THE LUMBERMAN

is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.  
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



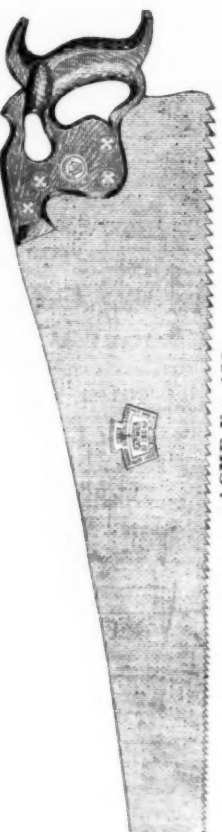
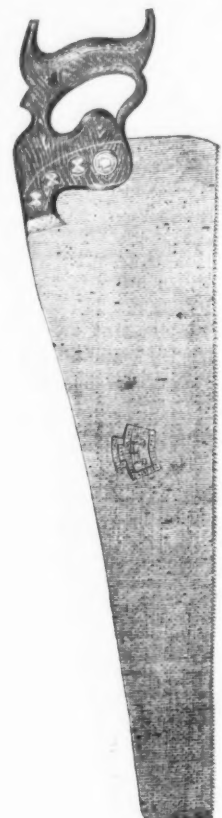
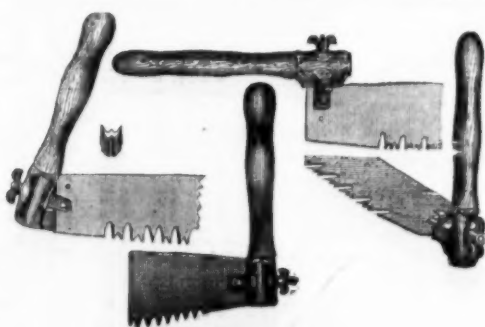
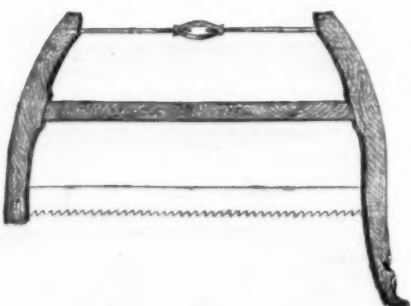
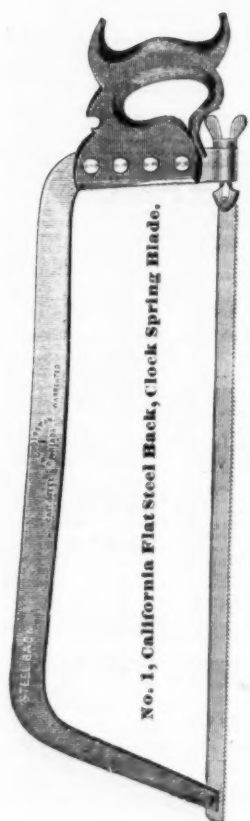
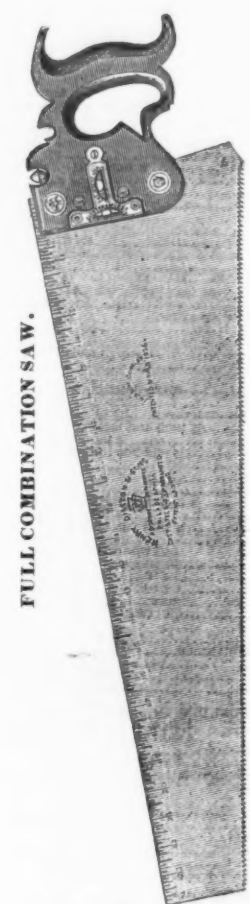
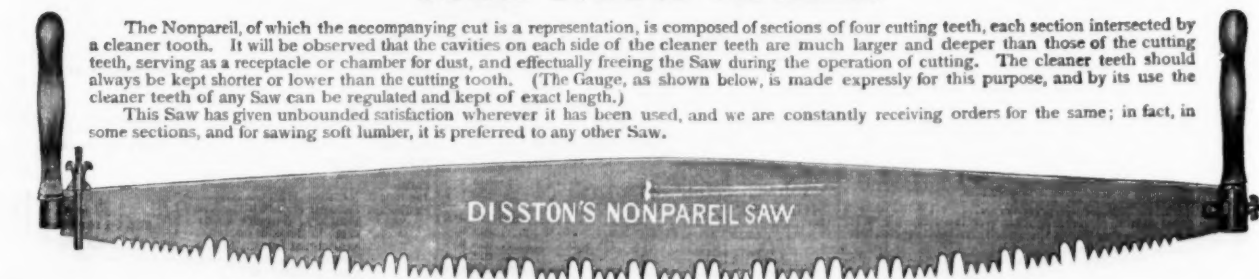
### THE CLIMAX.

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.  
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



### THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting teeth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)  
This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.





## HARDWARE.

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**Glass.**

PRINCE WINDOW GLASS.  
Prices current per box of 30 feet.

SIZES.		1st.	4d.	5d.	4th.
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14	10 x 24	8 50	7 75	7 25	6 75
24	20 x 30	10 75	9 75	9 25	8 75
30	24 x 30	12 25	11 25	10 75	10 25
36	24 x 36	13 00	11 50	11 25	10 75
42	30 x 36	14 50	13 25	12 75	12 25
48	30 x 48	15 00	14 00	13 25	12 75
54	30 x 54	16 00	14 50	13 75	13 25
60	36 x 60	17 25	15 50	14 50	14 00
72	48 x 72	18 75	17 25	16 00	15 50
84	60 x 84	20 75	18 75	17 25	17 00

Double Thick.

SIZES.		1st.	2d.	3d.	4th.
8	10 x 15	\$12 00	\$11 00	\$10 00	\$ 9 25
14	10 x 24	13 75	12 50	11 75	10 50
24	20 x 30	17 25	15 75	14 00	12 75
30	24 x 30	19 75	17 25	15 50	14 25
36	24 x 36	21 00	18 50	16 75	15 25
42	30 x 36	23 25	21 25	18 75	17 25
48	30 x 48	24 00	22 50	19 00	18 00
54	30 x 54	25 75	23 25	19 75	18 75
60	36 x 60	27 25	24 00	21 25	20 00
72	48 x 72	29 25	26 25	23 00	21 75
84	60 x 84	33 25	30 00	26 75	24 00

Sizes above 80 x 60—10 00 per box extra for every 40 inches.

An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 54 inches in length, and not making more than 84 united inches breadth, will be charged in the 84 united inches bracket.

Discount 50&15%.

**W. & CO.,**  
Merchants, Buffalo, N. Y.

Superior Brand,  
**IRON HORSE NAILS.**

Improved machinery and actually hammered from the best



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D., New York Agents.

**Patent**  
**FOR PLATFORMS.**



RE, OBLONG.  
Twenty-Six Sizes.

materials, all non-conductors of heat, WILL  
FD., as those constructed of only one thickness of  
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**Swivel Vise.**

The advantage claimed for this Vise over the ordinary patterns is in the ease with which it is adjusted to whatever angle may be required.

**Trenton Vise & Tool Works,**  
TRENTON, N. J.,  
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Picks, Mattocks, Grub Hoes, &c.

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other make. No broken boxes or screws.

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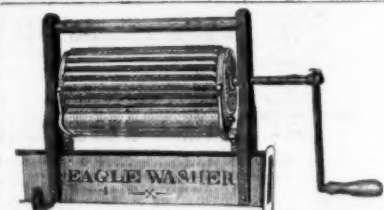
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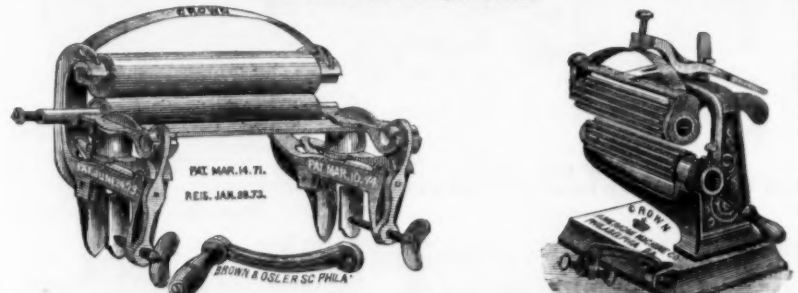


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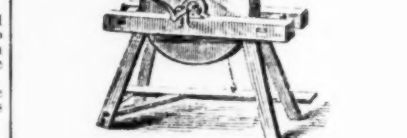
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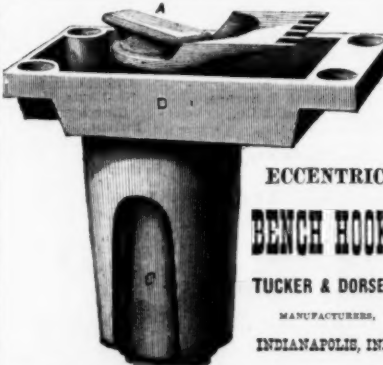
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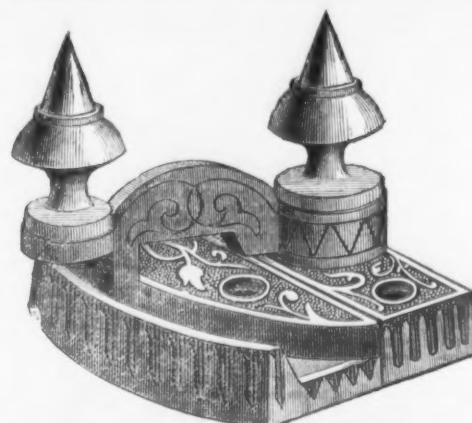
290 Pearl Street, New York.

**Potter's Patent**  
**STEP LADDERS.**Manufacturer of and Dealer in all descriptions of  
Moulders' and Plasterers' Tools,  
And Dealers inGeneral Hardware, Glided Copper Weather Vanes,  
CARTER'S PATENT CARRIAGE LIFTING JACK, &c.**The Hart, Bliven & Mead Mfg. Co.,**

18 &amp; 20 Cliff Street, and 243 &amp; 245 Pearl Street, New York.

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MANUFACTURERS OF

**BUILDERS' HARDWARE.**Figured Enameled, Bronze Metal, Nickel Plated, Japanned & Brass  
**SASH FASTENERS.**

Shutter Bars, Door Bolts, Cupboard Catches, &amp;c., in great variety.

Our Catalogue and "1876 Centennial Appendix" is now ready for distribution to patrons. A full set of sample  
and Post Office Box in the Main Building (F 7) Centennial International Exhibition, Philadelphia, Pa.**Lloyd, Supplee & Walton,**  
**HARDWARE FACTORS.**

MANUFACTURERS OF

**Bonney's Hollow**  
**AUGERS.**Stearn's Hollow Augers  
and Saw Vises

Bonney's Spoke Trimmers

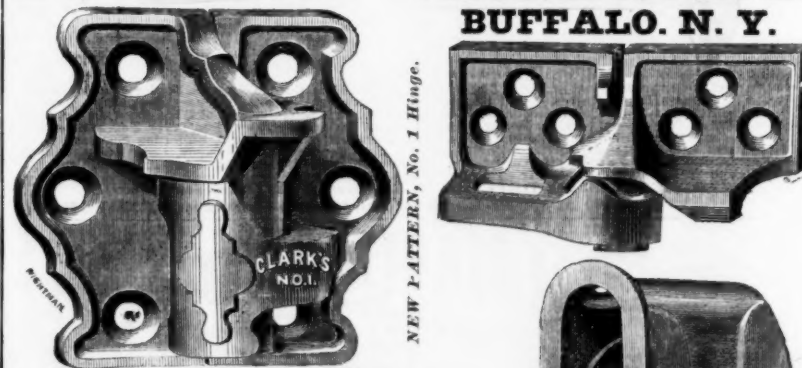
Double Edge Soke Shaves

Adjustable Gate Hinges

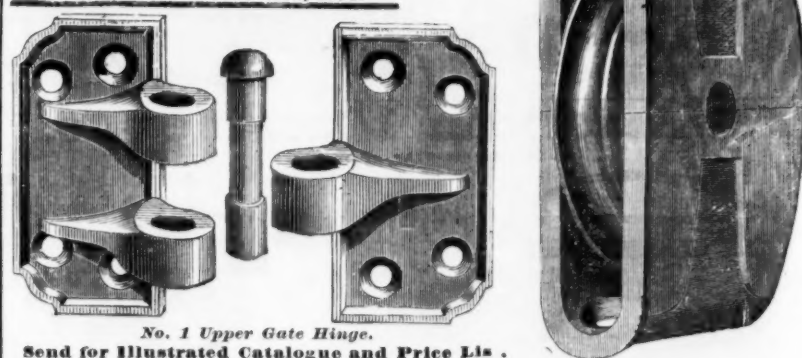
Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &amp;c., &amp;c.

625 Market St., Phila., Pa.

**CLARK & CO.,**  
MANUFACTURERS OF  
**BUILDERS' HARDWARE.**  
BUFFALO, N. Y.

Design Patented Jan. 11th, 1876.

No. 1 Upper Gate Hinge.  
Send for Illustrated Catalogue and Price List.**WILSON MANUFACTURING COMPANY.,**  
NEW LONDON, CONN.

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**SOLID BOX VISES.**

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp  
Heads and Screws, Parallel Bench Vises, Sash Pulleys, Ho  
House Pulleys, Composition Cocks, Bench Screws, Vise Screws,  
Gridirons, Drill Stocks and Bows, Box Chisels, Rivets,  
Sheaves, Block Pins, Composition Roller and Iron Bushings,  
Riggers' Screws, Caulkers' Tools, Pump Chambers, Relaying  
Pins, Martin Spikes, Malleable Iron Castings, and General  
Hardware.

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PHILADELPHIA.

(Corrected weekly by Lloyd, Sapples & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

**Anvils.**—Solid Cast Steel, 14c  
Peter Wright's, 10c  
Whitcomb's, 11c  
Eagle, 11c  
Apple Parers, Domestic, per doz \$ 6.50  
Peach Parers, 10.50  
Bay State Parer, Corer and Slicer, 12.50  
Other makes, 1.50  
Lots of 5 to 25 dozen special price.

**Axes.**—Main (according to weights). Per doz. \$10.50 @ 9.50  
Red Indian, 10.00 @ 10.50  
Red Chertlain, 10.00 @ 10.50  
Crown Prince, 11.00 @ 10.50  
Hunt's, 12.50 @ 11.50

**Augers and Auger Bits.**—  
Benjamin Pierce, 10c  
Douglas & Co's, 10c  
Connecticut Valley Auger Bits, 10c  
Cook's Bits, 10c  
Jennings' Bits, 10c  
Bates' Nut Augers, 10c  
Douglas & Co's Augers, 10c  
Watrous' Augers, 10c  
Kearney's Pat. Hollow Augers, 10c  
Stearns' Pat. Hollow Augers, 10c

**Balances.**—Light or "common", 25c  
All other Spring Balances, 25c  
Bells, Bevin Bros. Mfg. Co. Light Hand, 70c  
Common (Table) Balances, 70c  
Swiss Pattern Hand Bells, 70c  
Connell's Door Bells, 70c  
St. Western & Kentucky Cow, 70c

**Boring Machines.**—Bates Mfg. Co., com-  
plete with augers, 20c  
Douglas Mfg. Co., complete with augers, 20c  
Common boring Machines, no Augers, 5.00 @ 4.75  
Augers, 5.00 @ 4.75

**Bolts.**—Eastern Carriage Bolts, 10c  
Wagon Bolts, 10c  
Philadelphia, 10c  
Wrought Nutter, Stanley, 10c

**Braces.**—Barber's, 10c  
Bartholomew's American Ball, 10c  
Spartan, 10c  
Butts, East East Joint, 10c  
Broad, 10c  
Cast Fast Loose Joint, 10c  
Acorn, Loose Pin, 10c  
Mayers & Parham, 10c  
Acorn Jap'd, 10c  
Wrought Loose Pin, 10c  
Table Hinges and Back Flaps, 10c  
Narrow, 10c  
Loose Joint, 10c  
Parker's Hinged Bolts, 10c  
Buffalo Haw. Co., 10c  
Clark's, 10c  
Shepard, 10c  
Lull & Porter's (Phila.) Hinges, 10c  
Garretson's No. 1 Hinges, 10c  
Cherrytree No. 1, 10c  
Chains, German Hatter and Coll., 10c  
West Proof Co., 10c  
By the case, 50c  
Chain, 1/2c per lb. less

**Chisels.**—Socket Framing, 10c  
Socket Framing, 10c  
Tang, 10c  
Beatty's Framing and Firmer, 10c  
Custers, Iron rod, 10c  
Porcelain Wheel Bed, 10c  
Iron and Brass Wheel Plate, 10c  
Porcelain Wheel, 10c

**Clothes Wringers.**—Universal, 10c  
Novelty, 10c  
Monitor, 10c  
Discount on dozen lots, 2c per dozen

**Coffee Mills.**—Common box and Side, 10c  
Patent Box and Side, 10c  
Cutlery, Fray & Clark, J. Russell & Co. and Lamson & Goddard Mfg. Co. Manufacturers' net prices

**Drawing Kives.**—Hart Mfg. Co., 10c  
Adjustable Handle, 10c  
Heavy, 10c  
Tinned, 10c  
Burnished, 10c  
No. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

**Files.**—Nicholson Mill Files, new list  
Butcher's Mill, 10c  
Butcher's, 10c  
Taper, 10c

**Fluting Machines.**—Mrs. Knox—4 1/2 in. rolls, each \$3.50 net  
—8 in. roll, 8.00 net  
Imperial—4 1/2 in. roll, 3.50 net  
—8 in. roll, 8.00 net  
Crown—4 1/2 in. roll, 3.50 net  
—8 in. roll, 8.00 net

**Hammers.**—Verkes & Plumb, 10c  
Hammond & Son's, 10c  
Verke, 10c

**Hatchets.**—Beatty's, 10c  
Shingling and Half, 10c  
Verkes & Plumb, 10c  
Shingling and Half, 10c  
Claw, 10c

**Hinges.**—Strap and T, 10c  
Horse Nails, 10c  
Ausable, 10c  
Globe, 10c  
Brundage, 10c  
Putnam, 10c  
On Ausable Globe and Brundage 100 to 1000, 10c

**Knobs.**—Door Mortise and Rim, Min. | New list | Discount 35c  
—Eral and Postals, 35c  
Locks and Latches, 10c  
Door Locks, Rim and Mortise, 10c  
Tui and Cupboard, 10c  
American Padlocks, 10c  
Scandinavian Pad Locks, 10c

**Lanterns.**—Square Candle and Oil, 10c  
Globe for Oil, 10c  
Kerosene, 10c  
Tubular Lanterns, 10c

**Mattresses.**—Long and Short Cutter, 10c  
Western Pattern, 10c  
Pennsylvania Pattern, 10c

**Mechanics Mfg. Co.'s Measuring Faucets.**—10c  
Stebbins' Gates, 10c  
Lincoln's, 10c  
Landers, Fray & Clark's Pet. oleum, 10c  
Taylor's Petroleum Faucets, 10c  
Brass Liquor Cocks, 10c

**Ment Cutters.**—Dixon's, 10c  
Woodruff, 10c  
Stowe, 10c  
Hale's, 10c  
Stuffers, 10c

**Planers.**—Auburn Tool Co., Bench, 10c  
Second Quality, 10c  
Metallic Plane Co., 10c  
Evans Pat. Circular, 10c

**Plumb and Levels.**—Adjustable, 10c  
Non-Adjustable, 10c  
Plane Irons, American, 10c  
Butcher's, 10c  
Picks, Philadelphia, 10c  
Pittsburgh, 10c

**Rakes.**—Cast Steel Garden, 10c  
Malleable Garden, 10c  
Wood Head Iron Teeth, 10c

**Scythes.**—American Pattern, 10c  
No. 1, 10c  
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No. 100, 10c

**Scythes.**—Golden Clipper, Damascus Blade, Boxed and Sharpened, 10c  
Clipper No. 10, Bronze Blade Boxed and Sharpened, 10c  
Sharpened, 10c  
Clipper No. 6, Painted Box, Boxed and Sharpened, 10c  
Sharpened, 10c  
Cast Steel Scythes, 10c  
German, 10c

**Squares.**—Steel and Iron, new list, 10c

**Saws.**—Dieton's Cross Cut, No. 1, 10c  
Dieton's Cross Cut, No. 2, 10c  
Dieton's Cross Cut, No. 3, 10c  
W. McNeese's H. Q. Cross Cut & Circle, new list, 10c  
Boynton's Lightning, new list, 10c  
Boynton's Champion, 10c  
Boynton One-Man Cross Cut Saws, 10c  
Boynton Billet Webs (no Frame), 10c

**Shovels and Spades.**—Howard's Plain Shovel, 10c  
Back Strap, 10c  
Extra discount on above for 10 days' cash, 5c  
Oliver Ames & Sons, 10c  
Richmond (polished) shovels, 10c  
Richmond (polished) spades, 10c

**Stones.**—Arkansas Oil, No. 1, 10c  
Washita Extra, 10c  
No. 1, 10c  
Hindostan 8 inch, 10c

**United States and others in Combination.**—10c  
Keystone, not in Combination, 10c

**Spades.**—Plated, 10c  
Britannia, Boardman's (new list), 10c  
Parker's (old list), 10c  
German Silver, 10c  
Light, 10c

**Spring.**—Gray's Door, 10c  
Torry's Door, 10c  
Stove Polish, Gen., 10c  
Onyx, 10c

**Travellers.**—Waterbottom, 10c  
Stanley and Level Co., 10c  
Willis Thrall, No. 2, 10c  
Tacks, No. 2, 10c  
Trunk, Clout and Finishing Nails, 10c

**Traps.**—Genuine Onetia, Newhouse list, 10c  
Onetia, Newhouse list (set qual.), 10c  
Vice, 10c  
Vices, 10c  
Coca Imitation Wrought Bar, 10c  
Malleable Bar, 10c

**Wire.**—No. 0 to 18, (Advanced April 24th), 10c  
No. 19 to 26, 10c  
Coppered to 12, 10c  
Tinned Broom Wire, 10c  
Galvanized Wire No. 1 to 18, 10c

BUFFALO.

Reported by Messrs. Sidney Shepard & Co. Sept. 11, 1876.

**Augers.**—Snell Mfg. Co., 10c  
Axe-Francis, 10c  
Bills, Auger-Snell Mfg. Co., 10c  
Parker's, 10c  
Brace-Bit, Spofford's Patent, 10c  
Brace-Sheet, 10c  
Boards-Stove, Brooks' Pat. 10c  
Brick-Bath (box of 2 best English) 10c  
Can Openers-Sprague's, 10c  
Case-Parlor Coal Rod, 10c  
Chisels-Firmer Socket, 10c  
Framing Socket, 10c  
Corner socket Chisels, 10c  
Slick's Carpenters', 10c  
Castings-Malleable, 10c  
Cocks-Globe and Bibb, 10c  
Cutters-Meat, "Hales", 10c  
Egg Beaters-"Dover", 10c  
Files-Matchless Bros., 10c  
Fluters-Genova Hand, 10c  
Freezers-Ice Cream-"Champion", 10c  
Gauges-Henry W. Alder, 10c  
Hinges-Window-Ring, 10c  
Hods-Coat-Plain, Black and Galvanized, 10c  
Funnel, Black and Galvanized, 10c  
Fancy and Helmet, 10c  
Sad Irons, 10c  
Kettles-Brass, 10c  
Copper, Hand Made, 10c  
Enamelled, 10c  
Knives, Drawing-Oval No. 1, 10c  
Razor Blade, 10c  
Lanterns, Tubular, with guard, 10c  
Without guard, 10c  
Machines-Apple Paring, 10c  
Machines-Firmer, Snell, 10c  
Mills, Coffee-Box and Side, common, 10c  
Box Union and Eagle, 10c  
Cane Nails, "Harrisburg", 10c  
Horse, Ausable, 10c

**Paint.**—White Lead, U. S. Gov't, 10c  
Frying, 10c  
Rivets-Iron, Black and Tinned, 10c  
Screws-American Screw Co., 10c  
Flat Head, Iron, 10c  
Flat Head, Brass, 10c  
Shoes-Wood, Hoop iron, with, 10c  
Skinner's, 10c  
Sitters-Ash, 10c  
Skates and Straps-White, 10c  
Spoons, Iron Tinned, 10c  
S. S. & Co., Kitchen, 10c  
Plated Rogers' A No. 1, 10c  
Britannia, 10c  
G. S. Hall, Elyton & Co., 10c  
Scales-Buffalo Scale Works, 10c  
Fairbanks, 10c  
Stove Polish-Dixon's, 10c  
Palace, 10c  
Squeezers-Lemon, Porcelain, 10c  
Tacks-Half Weight Am. Iron, 10c  
Tea Trays, 10c  
Thermometers-Tin Case, 10c  
Tools-Tinmen, 10c  
Vases-Palace Case, 10c  
Vices, 10c  
Parallel, Buffalo, 10c  
Ware-French, Tinned and Iron, 10c  
Stamped and Jannaned, 10c  
Cast Iron Hollow, 10c  
Wire-Brass and Copper, 10c  
Wire-Hessner Steel, 10c  
Wingers-Novelty, 10c  
Tin Plates-Add for each 3, 10c  
10x14, 10x16, 10x18, 10x20, 10x22, 10x24, 10x26, 10x28, 10x30, 10x32, 10x34, 10x36, 10x38, 10x40, 10x42, 10x44, 10x46, 10x48, 10x50, 10x52, 10x54, 10x56, 10x58, 10x60, 10x62, 10x64, 10x66, 10x68, 10x70, 10x72, 10x74, 10x76, 10x78, 10x80, 10x82, 10x84, 10x86, 10x88, 10x90, 10x92, 10x94, 10x96, 10x98, 10x100

**Sheet Iron.**—18 Common, 10c  
24 Common, 10c  
28 Common, 10c  
24 W. D. Wood & Co., Smooth Finish, 10c  
Plated, 10c  
Gen. Russia, No. 1 stained, 10c  
Galvanized, 10c

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PITTSBURGH.

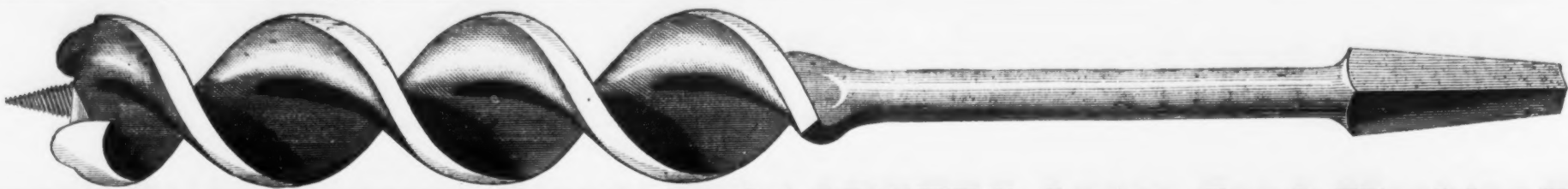
The following are the Card rates, f. o. b. in Pittsburgh of Lewis, Oliver & Phillips, H. B. Newhall, 11 Warren St. New York, Agent.

Iron, standard list assorted sizes, for large orders, special quotations to include hands, small Rounds and Oval, 2c. rate, 2c off net.

Merchant Bar Iron, as per terms named above.  
Flat Bar (1 1/2 x 1/2), punched and count's end, 1c off net  
Norway Nail Rods, 1c off net  
Iron Crow Bars, 1c off net  
Beetle Rings, 1c off net  
Fence Pickets, 1c off net

Carriage and Tire Bolts, 25c off net  
Stove Bolts, 25c off net  
Elevator Bolts, 25c off net  
Machine and Square Head Bolts, 25c off net  
Coach and Lag Screws, 25c off net  
Bolt Ends, 25c off net  
Pat. Hot Pressed, 25c off net  
Washers, all made from new band iron, 25c off net  
Nuts and Washers, 1 lb. diam, 3c off net; 1/2 lb. diam, 2c off net; 1/4 lb. diam, 1c off net; 1/8 lb. diam, 1/2c off net; 1/16 lb. diam, 1/4c off net; 1/32 lb. diam, 1/8c off net; 1/64 lb. diam, 1/16c off net; 1/128 lb. diam, 1/32c off net; 1/256 lb. diam, 1/64c off net; 1/512 lb. diam, 1/128c off net; 1/1024 lb. diam, 1/256c off net; 1/2048 lb. diam, 1/512c off net; 1/4096 lb. diam, 1/1024c off net; 1/8192 lb. diam, 1/2048c off net; 1/16384 lb. diam, 1/4096c off net; 1/32768 lb. diam, 1/8192c off net; 1/65536 lb. diam, 1/16384c off net; 1/131072 lb. diam, 1/32768c off net; 1/262144 lb. diam, 1/65536c off net; 1/524288 lb. diam, 1/131072c off net; 1/1048576 lb. diam, 1/262144c off net; 1/2097152 lb. diam, 1/524288c off net; 1/4194304 lb. diam, 1/1048576c off net; 1/8388608 lb. diam, 1/2097152c off net; 1/16777216 lb. diam, 1/4194304c off net; 1/33554432 lb. diam, 1/8388608c off net; 1/67108864 lb. diam, 1/16777216c off net; 1/134217728 lb. diam, 1/33554432c off net; 1/268435456 lb. diam, 1/67108864c off net; 1/536870912 lb. diam, 1/134217728c off net; 1/1073741824 lb. diam, 1/268435456c off net; 1/2147483648 lb. diam, 1/536870912c off net; 1/4294967296 lb. diam, 1/1073741824c off net; 1/8589934592 lb. diam, 1/2147483648c off net; 1/17179869184 lb. diam, 1/4294967296c off net; 1/34359738368 lb. diam, 1/8589934592c off net; 1/68719476736 lb. diam, 1/17179869184c off net; 1/137438953472 lb. diam, 1/34359738368c off net; 1/274877906944 lb. diam, 1/68719476736c off net; 1/549755813888 lb. diam, 1/137438953472c off net; 1/1099511627776 lb. diam, 1/274877906944c off net; 1/2199023255552 lb. diam, 1/549755813888c off net; 1/4398046511104 lb. diam, 1/1099511627776c off net; 1/8796093022208 lb. diam, 1/2199023255552c off net; 1/17592186044416 lb. diam, 1/4398046511104c off net; 1/35184372088832 lb. diam, 1/8796093022208c off net; 1/70368744177664 lb. diam, 1/17592186044416c off net; 1/140737488355328 lb. diam, 1/35184372088832c off net; 1/281474976710656 lb. diam, 1/70368744177664c off net; 1/562949953421312 lb. diam, 1/140737488355328c off net; 1/1125899906842624 lb. diam, 1/281474976710656c off net; 1/2251799813685248 lb. diam, 1/562949953421312c off net; 1/4503599627370496 lb. diam, 1/1125899906842624c off net; 1/9007199254740992 lb. diam, 1/2251799813685248c off net; 1/18014398509481984 lb. diam, 1/4503599627370496c off net; 1/36028797018963968 lb. diam, 1/9007199254740992c off net; 1/72057594037927936 lb. diam, 1/18014398509481984c off net; 1/144115188075855872 lb. diam, 1/36028797018963968c off net; 1/288230376151711744 lb. diam, 1/72057594037927936c off net; 1/576460752303423488 lb. diam, 1/144115188075855872c off net; 1/1152921504606846976 lb. diam, 1/288230376151711744c off net; 1/2305843009213693952 lb. diam, 1/576460752303423488c off net; 1/4611686018427387904 lb. diam, 1/1152921504606846976c off net; 1/9223372036854775808 lb. diam, 1/2305843009213693952c off net; 1/1844674407

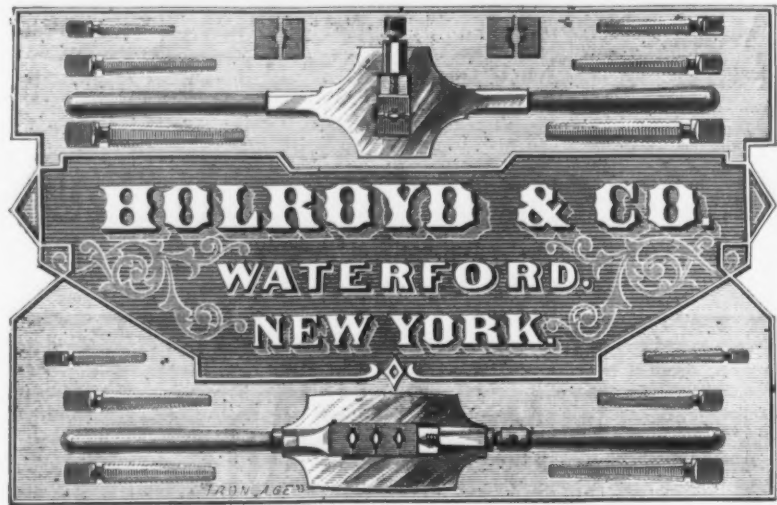




## Kasson's Patent Concavo-Convex Twist AUGERS, Auger, Car & Machine Bits.

The front or working faces of these Augers and Bits are Concave, and the rear faces are Convex. This peculiar construction reduces friction in boring, prevents clogging, and enables the operator to do more work with less effort than with any other Auger or Bit now in use. They do not require to be withdrawn for clearance of chips while any part of the twist is outside the surface of the wood. Correspondence and orders solicited from dealers. Manufacturers supplied with machine Bits (saw lip for cross, or curved lip for end boring) of any length of twist required.

**MILWAUKEE MANUFACTURING CO., Sole Manufacturers, MILWAUKEE, WIS.**



### The National Steel Tube Cleaner.



Patented July 28, 1874.

Guaranteed to clean better, last longer and work easier than any in the market. Removes all Carbon and Scale from the Boiler Tubes. Adopted and in use by United States Navy. For sale by dealers.

**THE CHALMERS SPENCE CO., Foot East 9th St., N. Y., Agents for the United States.**

### C. SCOFIELD'S STRAIGHTENER OR BENDER, For Shafting, Axles Tubes, Rails, &c.

There has long been a want of some device by which the straightening of shafting could be done without removing the work from the centers, and at the same time do it quickly and accurately. The

**SCOFIELD PATENT SHAFT STRAIGHTENER** meets just such a want; the apparatus is light and can be easily handled, yet it is of sufficient strength for the purpose required. It can be placed upon the shears of the lathe, and moved along the entire length of the work. It is especially

**Adapted to Removing Short Bends,** which frequently occur in long lengths of shafting. The lightness of the Straightener renders it eminently

**Adapted for Line and Counter-Shafting,** without necessitating the time and trouble of removing hangers and detaching couplings, but can be

**Easily applied to the Shaft while in Position.**

It can also be used on the bench for short lengths.

For Circulars, Price List, &c., Address,

**C. SCOFIELD & CO.,**

Vineland, N. J.



### OVER 300 IN SUCCESSFUL OPERATION. The "Dead Stroke" Power Hammer

With Belden's Recent Improvements.

Guaranteed the best in Every Essential. Takes Less Room, Less Power, and costs Very much Less for Repairs than any other. Send for descriptive circular with names of over 200 using them—(to whom we refer.)

**THE HULL & BELDEN CO., DANBURY, CONN.**

If we are advised as to the average work for which hammer is required, we will furnish the proper size and guarantee satisfaction or no pay.

WE ALSO MANUFACTURE **Machinists' Tools & Special Machinery.**

**THE "CLIMAX" PIPE WRENCH,** (Latest and Best.)

**THE "DANBURY" DRILL CHUCK,** (Recently improved and reduced in price.)

Hardware Specialties to Order. Models, Dies and **IRON & STEEL DROP FORGINGS.**

### SNYDER'S LITTLE GIANT STEAM ENGINE

The Best SMALL POWER ENGINES IN THE COUNTRY. Manufactured by **WARD B. SNYDER, 84 Fulton St., NEW YORK.**

One-Horse Power, with tubular boiler complete, only...\$150.  
Two-Horse Power.....200.  
Three-Horse Power...250.

Call and Examine OR SEND FOR AN ILLUSTRATED CATALOGUE.

TO BE SEEN AT THE CENTENNIAL EXHIBITION.



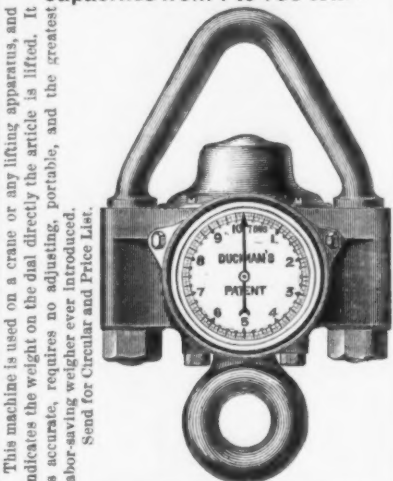
### The Old Reliable Pioneer Poke.

The only Poke made with an oil tempered Cast Steel Spring. Our Pokes are manufactured under the personal supervision of the proprietors themselves, from the very best selected Oak and Hickory Timber, and finished in the very finest style. We warrant our goods to be first-class in every respect. For further particulars and price please address

**BISHOP & BENEDICT, Berea, Ohio.**

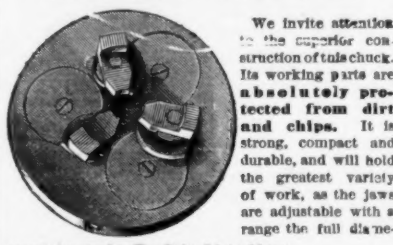
### THE "DUCKHAM" PATENT Suspended Self-Indicating WEIGHING MACHINE.

Capacities from 1 to 100 tons.



**ROBERT KING, MANUFACTURER, Hydraulic Presses, Accumulators, &c. 246 to 250 Plymouth St., Brooklyn, N. Y.**

### JOHNSON'S PATENT UNIVERSAL LATHE CHUCK.



We invite attention to the superior construction of this chuck. Its working parts are absolutely protected from dirt and chips. It is strong, compact and durable, and will hold the greatest variety of work, as the jaws are adjustable with a range the full diameter of the chuck. For Price List address,

**Lambertville Iron Works, Lambertville, N. J.**

### BUFFALO Bellows Factory and Planing Mill. ESTABLISHED 1852.

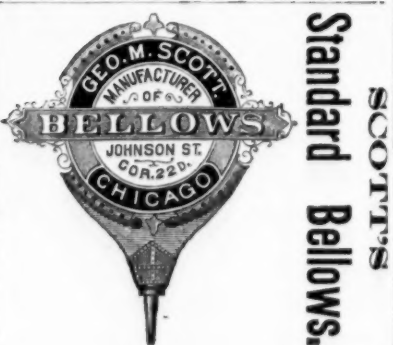
### JOSEPH CHURCHYARD, Contractor, Builder

AND **Manufacturer, CLINTON, cor. ADAMS STS., Buffalo, N. Y.**

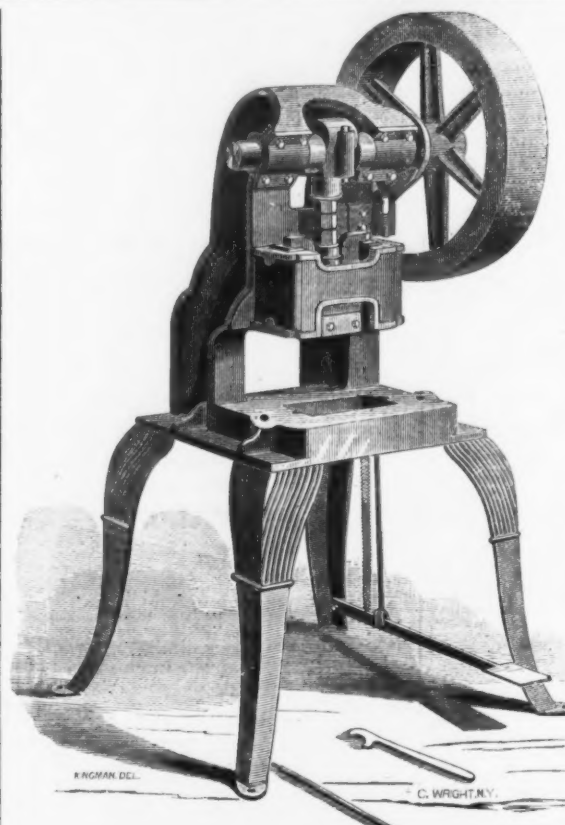
**SASH, BLINDS DOORS,** Cisterns, Tanks, Stairs, Hand Ralls, Newels, Mirror Frames, Mantels, Curtain Cornices, Book Cases, Veneered Doors, Mouldings, and complete interior and exterior finish for houses.

**ROUGH AND PLANED LUMBER,** Flooring, Siding, Shingles, Lath and Fence Posts.

**Blacksmiths' & Moulders' Bellows.**



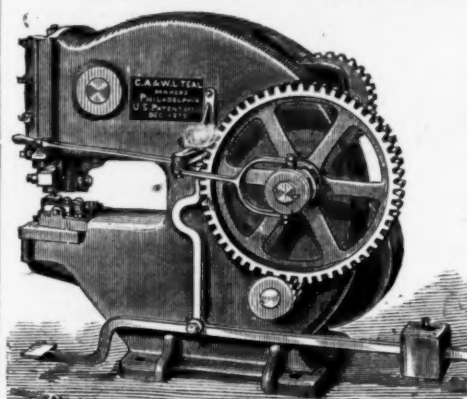
**NEWCOMB BROS., Standard Bellows.**



### BLISS & WILLIAMS, PRESSES, DIES, & SPECIAL MACHINES, FOR WORKING SHEET METALS, &c.

167 to 173 Plymouth Street, Cor. of Jay, Brooklyn, N. Y.

### C. A. & W. L. TEAL, Manufacturers of IMPROVED BENDING ROLLS



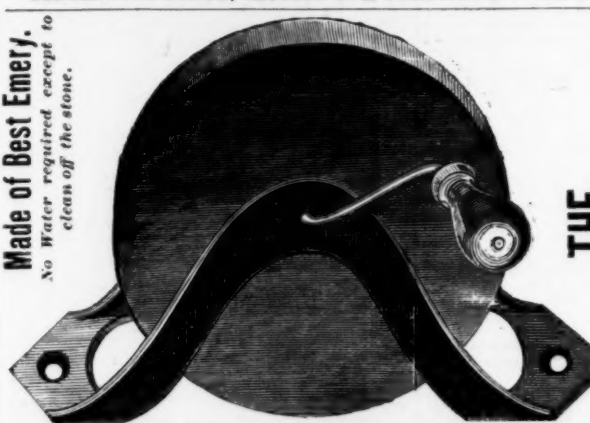
Arranged for Removing Work from the end of top roll.

**COMBINED Punching and Shearing Machines, Single Power Punching Machines with Shearing Attachments, Rotary Shearing Machines, Steam Riveting Machines, "Atherton's" Patent "Cam," Steam Engines, Hair Picking Machines and MACHINERY in general.**

We would call special attention to the above engine, as it has the same leverage on the driving shaft at every point of the stroke that the "crank" has at its strongest point, making a smoother running as well as a more powerful engine.

**4116 Ludlow St., Philadelphia.**

**CENTENNIAL SPACE, SECTION C. 3, COLUMNS 25 & 26, MACHINERY HALL.**



### THE FAMILY GRINDSTONE MFG. CO., NEWARK, N. J.

\$3.00 Per Doz.

### NORTHWESTERN HORSE NAIL CO.

ESTABLISHED IN 1862.

### HAMMERED AND FINISHED HORSE NAILS.

We offer our Finished Nail to the trade with the confidence that it has no equal in the market. It is the genuine "Northwestern" Nail, Finished, and we give it our unqualified guaranty.

Office and Factory, 56 to 68 Van Buren st., Chicago.

**A. W. KINGSLAND, Secretary.**

### GLOBE NAIL COMPANY,

MANUFACTURERS OF

### Pointed, Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.

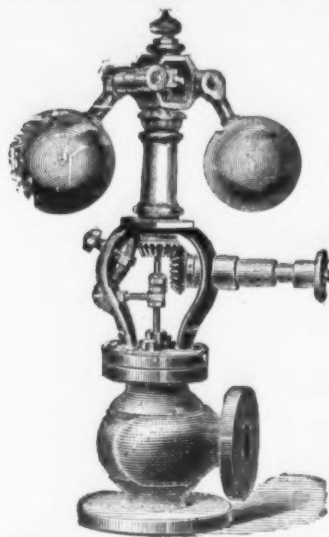
All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

**GLOBE NAIL CO., Boston, Mass.**









## TO ALL WHO USE STEAM-POWER!

We will put our Governor on any Engine, and guarantee it to prove itself superior to all others. If, after a fair trial, it does not, we will take it off at our own expense.

**Shive Governor Co.**  
BETHLEHEM, PA.

SHIVE'S PATENT WATCHMAN'S  
CLOCK AND DETECTOR,

Buoy's Patent Counter Scale,  
No Nest of Weights.

Circulars sent free

## THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacks durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

## Reduced Price List, JANUARY 25th, 1876.

For dimensions of Governor, see Illustrated Price List.



THE JUDSON PATENT

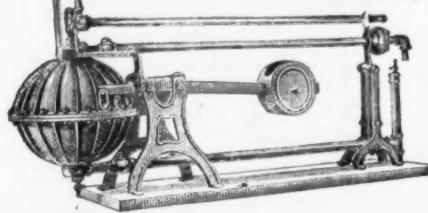
Improved Steam Governor.

No Charge for Boxing & Cartage.

JUNIUS JUDSON & SON, Rochester, N. Y.

Size, Inch.	Plain.	Bright Finish.	Extra for Lever.	Stop Valve.
1	\$17.00	\$19.00	\$1.90	..
1 1/2	21.00	24.00	2.00	\$5.00
2	25.00	28.00	2.25	6.00
2 1/2	29.00	33.00	2.50	8.00
3	35.00	40.00	2.75	10.00
3 1/2	42.00	48.00	3.25	14.00
4	45.00	51.00	3.50	15.00
4 1/2	49.00	56.00	3.75	17.00
5	55.00	63.00	4.25	20.00
5 1/2	64.00	73.00	4.50	25.00
6	74.00	84.00	5.00	30.00
6 1/2	86.00	97.00	5.50	36.00
7	94.00	106.00	6.00	42.00
7 1/2	112.00	125.00	6.50	48.00
8	125.00	138.00	7.00	54.00
9	150.00	165.00	8.00	68.00
10	185.00	202.00	9.00	80.00
12	205.00	225.00	10.00	..

## The Albany Steam Trap.



This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

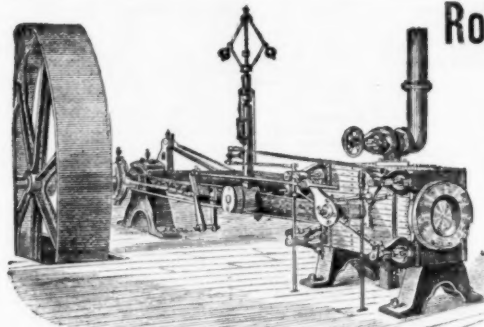
Albany Steam Trap Company,  
Albany, N. Y.

## The Pratt & Whitney Co., Hartford, Conn.,

Have constantly on hand and making

## Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



Robt. Wetherill & Co  
CHESTER, PA.

Corliss Engine  
BUILDERS.

Shafting & Gearing,  
Boiler Makers.

## THORNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.  
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.  
VERTICAL DRILLS. Self-feeding.  
MULTIPLE DRILLS. 2 to 20 Spindles.  
HORIZONTAL BORING AND DRILLING MACHINES.  
HAND DRILLS. CAR BOX DRILLS.  
SPECIAL DRILLS. For Special Work.

## BLAKE'S PATENT STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROAD, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

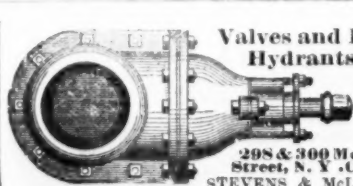
IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Fluorite, Soapstone, &c.  
For Illustrated Circulars, and particulars, address

BLAKE CRUSHER CO., New Haven, Conn.

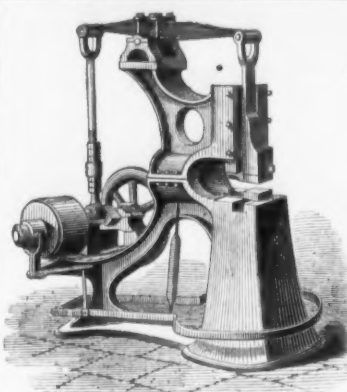


Stevens & McLean  
298 & 300 Monroe St.,  
New York,  
AGENTS.

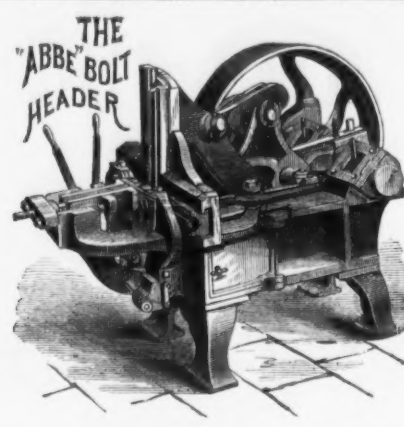


Valves and Fire  
Hydrants.

298 & 300 Monroe  
St., N. Y. City.  
STEVENS & McLEAN.



THE PALMER POWER SPRING HAMMER.



Of these Machines we are building sizes to meet the requirements of all Manufacturers and Workers of Iron and Steel. In simplicity, durability, ease of operation, accuracy, and range of work, we guarantee them superior to any Machines of their kind produced in the world. For prices, references, and full descriptive circulars, address

**S. C. FORSAITH & CO.,**  
Manchester, N. H.

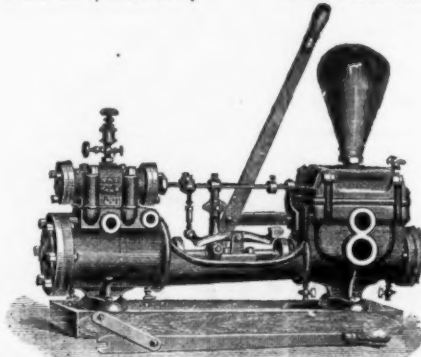
## Knowles Patent Steam Pumps

MANUFACTURED BY THE

**KNOWLES STEAM PUMP WORKS,**  
WARREN, MASS.

WAREHOUSES:

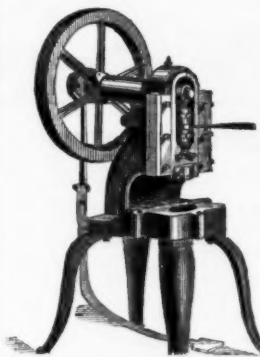
14 & 16 Federal Street, Boston, 92 & 94 Liberty Street, N. Y.



Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

## FIRE PUMPS a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern), which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best. Every machine furnished under a complete guarantee.



## A. H. MERRIMAN, Patent Power

**Punching Presses.**

Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock of the wheel running at 125 revolutions.

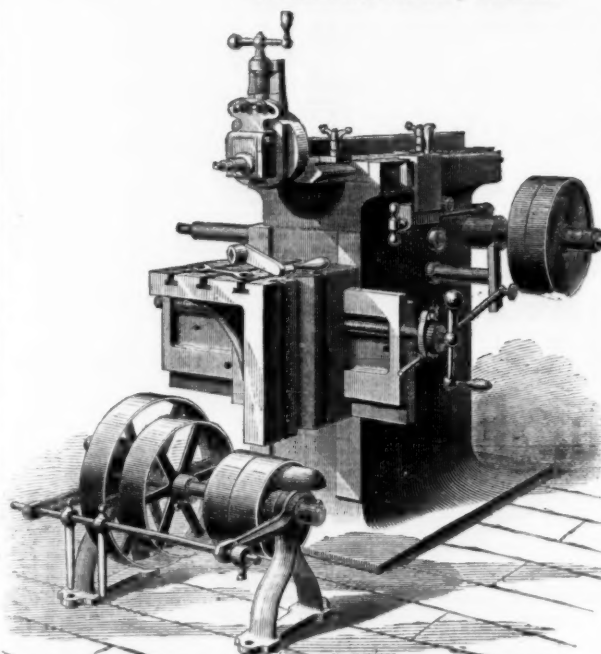
West Meriden, Conn.

Machinery Hall, Philadelphia, Section B 4, Columns 28 and 29.

## THE HENDEY MACHINE CO.

MANUFACTURERS OF

**THE MANVILLE  
Patent Planers and Shaping Machines.**  
WOLCOTTVILLE, CONN.

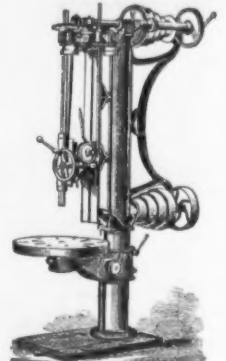


Any length of stroke from 3/4 to 24 inch in length, while machine is running with perfect uniformity of speed of cutting tool. Automatic cross feed of 19 inch and 16 inch, from top of table to bottom of slide when table is down. Send for Circular and Price List.

T. S. & A. J. KIRKWOOD, 171 & 173 Lake St., Chicago, Agents.

## P. BLAISDELL & CO., WORCESTER, MASS.

Manufacturer of the



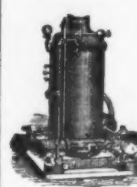
"BLAISDELL" UPRIGHT DRILLS  
And other First-Class Machinists' Tools.

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DEALERS IN ALL KINDS OF

## Lubricating Oils.

West Virginia Lubricating Native Rock Oil! Used by most of the Railroads in the United States, Canada and Europe, and by Mechanics on all kinds of Machinery. The Safest, Cheapest and Most Reliable Lubricator in the world. Obtained the High 1st Prize at the Paris Exposition, 28, 29, 30 and 31 Gravity. No. 26 CEDAR STREET, NEW YORK.



The Whitmore Engine.  
SAFEST, CHEAPEST & BEST.

Lovegrove & Co.,  
No. 121 South Fourth Street,  
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Sole Manufacturers  
Engines, Boilers and  
Steam Pumps.

## FRASSE & CO., 62 Chatham St. N. Y.

Importers of and Dealers in

Stubs' Tools, Files, Bright Round Steel Wire, Bar & Sheet Steel, &c.

## BEST PIERCING SAWS

For Scroll Sawing.

French, German, English & American

TOOLS, FILES, STEEL WIRE AND  
SUPPLIES.

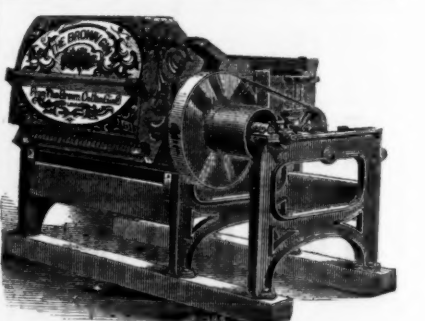
Agents for the

**ALMOND DRILL CHUCK.**

## OHL & HAUSCHILD, Engineers & Machinists

And manufacturers of

Lathes, Shapers, Slotters, Planers, Gear Cutters, Drill and Power Presses, Pulleys, Hangers, and Shafting, Machinery and Machinists' Tools in general.  
37, 59 & 61 Passaic Avenue,  
Kearney (East Newark), N. J.



The Brown Cotton Gin Co.

NEW LONDON, CONN.

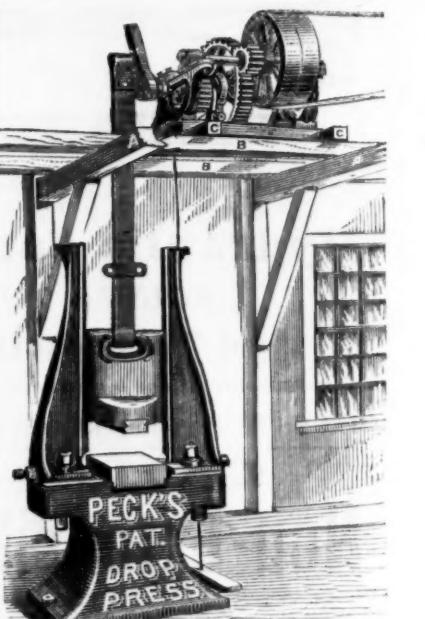
Manufacturers of

**COTTON GINS,**

With or without

Self-Feeding Attachment & Condenser.

Cotton Gin Saws, Ribs and other Gin materials. Also  
Albion's Segment Screw Cotton, and Hay  
Press. Send for Circular.



I have the largest and best stock of Drop Press Patterns in the country—suitable for Forging, and all kinds of Sheet Metal work.

## WHY THE BEST:

It requires less power, works faster, gives a harder blow with same weight of hammer, the rebound of the hammer is caught without lessening the force of the blow, the blow is uniform and not affected by variations in the speed of the driver. It is always in order. The Drop Press a specialty.

**MILO PECK, New Haven Conn.**



Machinery, &c.

THE  
Shapley Engine

Patented Feb. 10, 1874.

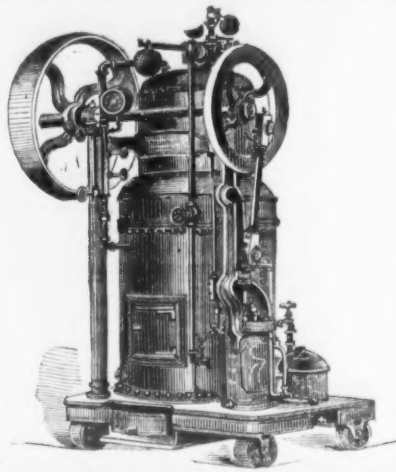
COMPACT,  
PRACTICAL,  
DURABLE,  
ECONOMICAL.  
\$200.00.

Cheaper than any Engine offered of  
the same capacity.

MANUFACTURED BY

SHAPLEY & WELLS,  
Binghamton Iron Works,  
Binghamton, N. Y.

Manufacturers of Steam Engines, Boilers, Water Wheels, Circular Saw Mills and  
Mill Work generally.



BUSH HILL IRON WORKS,

Corner 16th & Buttonwood Streets  
PHILADELPHIA.

JAMES MOORE,

(Successor to MATTHEWS & MOORE.)

Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or  
Composition Metals.

Sugar Mill, Saw Mill and Crist Mill Machinery,  
AND MILLWRIGHTING IN GENERAL.

BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of  
TANK AND PLATE IRON WORK.

**Chas. W. Ervien & Bro.**  
IRELAND ST.  
Kensington, PHILAD'A  
BUILDERS OF  
STATIONARY & MARINE  
ENGINES, BOILERS  
SHAFTING, GEARING,  
AND  
MILL WORK  
GENERALLY.  
Special Machinery  
BUILT TO ORDER.

Vertical and Horizontal  
Engines, of New and  
Heavy Designs, from  
2 to 100 H. P. on  
hand, or in pro-  
cess of erection.

CENTENNIAL SPACE:  
Sec. B 9, Column 69, Machi-  
nery Hall.

Visitors invited to in-  
spect our improved method of  
starting engines.

**Keystone Pressure Blowers.**  
Anti-friction and noiseless; maximum blast and minimum power;  
all sizes for  
Forges, Foundries, Rolling Mills, &c.  
ALSO  
**KEYSTONE EXHAUST BLOWERS.**  
Made on same principle,  
For Ventilating Mines, Buildings, etc.; Removing Dust,  
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Blower guaranteed. Send for circular, or  
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Of superior Quality and Hardware Specialties in  
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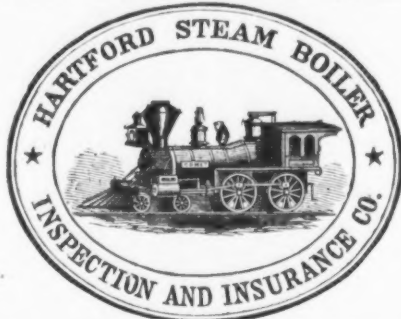
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Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters  
Are of Improved and Patented Construction.

Railway Turning and Transfer Tables,  
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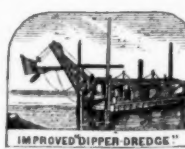
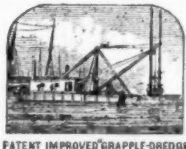
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**BUILDERS OF STEAM DREDGING MACHINES,  
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IMPROVING RIVERS AND HARBORS,  
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NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.

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Drills for Coes, Worcester, Hunter and other Hand Drill  
Presses. Beach's Patent Self-Centering Chucks, Center  
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Drill Grinding Machines. Taper Reamers, Mill-  
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All Tools exact to Whitworth Standard Gauges.

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Successors to the WOODRUFF & BEACH IRON WORKS,

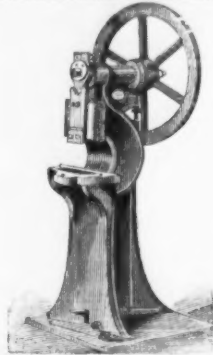
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**Marine & Stationary Engines, Mill Gearing,  
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**PUMPING ENGINES**, for City and Town Supply a Specialty.

60 to 96 Commerce Street, HARTFORD, CONN.

Machinery, &c.



REPORT OF JUDGES

In Department V, Group 3, at the 44th

Exhibition of the

**AMERICAN INSTITUTE,**

Held in the City of New York, Oct., 1875.

**No. 318, Drawing, Drop &  
Punching Presses.**

**THE STILES & PARKER PRESS CO.,**  
Of Middletown, Conn.

The machinery exhibited by these makers is of a  
character that calls for special commendation. In  
addition to their well known punching presses, to  
which a new feature has been added in a press ad-  
justable to an inclination for discharging work left  
above the die, there are exhibited by them a com-  
bined punch and shears, a drawing or blanking press,  
and a drop.

In all these there is shown the highest mecha-  
nical culture, applied to meet every practical require-  
ment, to avoid every practical difficulty, and to enlarge the  
range of application of the machines, by devices  
which are at once simple, elegant, and effective.

Your committee would unhesitatingly recommend  
for this exhibition the "Medal of Progress," but  
find such award debarred by the rule of the Institute,  
forbidding such award unless a Silver Medal has  
been previously awarded. We, therefore, respect-  
fully recommend the award of a Silver Medal.

**Silver Medal Awarded.**  
A true copy from the Report on file.  
JOHN W. CHAMBERS, Sec'y.

**AQUOMETER  
Steam Pump.**



Highest Premium awarded by  
Franklin Institute, 1874.

For Simplicity, Economy of  
Construction & Efficiency.

An absolutely Durable, Cheap, Efficient and Eco-  
nomical Steam Pump. Requires no special care or  
lubricating. Warranted. Address for circular.

**AQUOMETER STEAM PUMP CO.,**  
10 South Dela. Avenue, Philadelphia.

WASHINGTON, D. C.,  
Sept. 13, 1876  
JNO. MAYER,  
Treas. Valley Machine  
Co., East Hampton,  
Mass.

DEAR SIR: The  
"Wright Bucket Plun-  
ger Steam Pump," you  
built for the Govern-  
ment "works like a  
top." Am sure it has  
never had its equal in  
any of the departments,  
and I have no hesitancy  
in recommending this  
Pump to any one in  
want of a first-class,  
noiseless Steam Pump.  
Very respectfully,  
J. THOS. MILLER,  
Chf. Engineer U. S.  
House of Representatives.

Send to us for Catalogue.

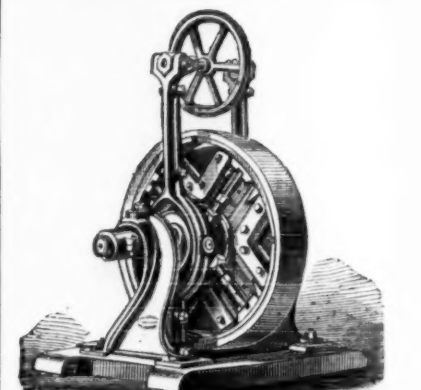
**Valley Machine Co.**

**EUREKA SAFETY POWER!**



Practically impossible to  
explode. Tested to 30 lbs  
pressure per square inch. Will  
lift 2 inch seasoned oak-grind  
bushels corn per hour. Price  
\$250. Also Stationary Engines  
and Boilers and Spark Arres-  
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plantation use. Send for our cir-  
cular. Discount to the trade.

**R. W. PAYNE & SONS,**  
Corning, N. Y.



**VOLNEY W. MASON & CO.,**  
Manufacturers of PATENT

**FRICTION PULLEYS,**

Friction Clutches

For Connecting Shafting and Gearing.

**ELEVATORS.**

Lafayette Street, PROVIDENCE, R.



## TUBAL SMELTING WORKS,

760 South Broad Street, PHILADELPHIA.

PAUL S. REEVES,  
MANUFACTURER OF

## ANTI-FRICTION METALS.

XXX Genuine.....	40c	C.....	30c
XX.....	35c	D.....	15c
X.....	30c	E.....	13c
A.....	25c	F.....	11c

Note.—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

BRASS CASTINGS, 21 to 25c.      INGOT BRASS, 19 to 22c.      BRASS TURNINGS AND OLD METALS WANTED.

ESTABLISHED 1842.

WM. & HARVEY ROWLAND,  
PHILADELPHIA,

P. O. Address: Frankford, Philad'a.      MANUFACTURERS OF ALL KINDS OF

## Elliptic, Platform and C Springs,

MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.  
CAST SHOVEL, HOE AND MACHINERY STEEL.OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.  
BESSEMER SHOVEL AND PLOW STEEL.

BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.  
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

## Iron Clad Can Co.,

23 CLIFF STREET, N. Y.

THIS CUT REPRESENTS THE  
IRON CLAD  
FIRE SHOVEL

We call the attention of the trade to our New Stove or Fire Shovel. It is far superior to anything in the market, for the following reasons:

It is made from one piece of Metal, both blade and handle; therefore is as cheap as the cheapest.

There being no corrugations to catch dirt, it is always clean.

The handle being half round at the junction of the blade makes it the strongest Shovel ever manufactured, (where all other Shovels fail.)

The upper part of the handle being round makes it the most convenient handle, and the same being hollow is always cool.

To convince yourselves of the above facts, send for sample.

P. S.—We have noticed a circular issued by the East River Sheet Metal Mfg. Co., informing the Trade "that there are parties manufacturing a Fire Shovel made in one piece and corrugated at or near the junction of handle and blade," upon which they hold a patent. We do not know to whom they refer, but if to us we wish to say that we manufacture our Shovel under Letters Patent of the U. S. granted to us and we guarantee all parties purchasing goods from us against all loss or damage by infringements of every kind and nature.

## IRON CLAD CAN CO.,

Manufacturers of STAMPED WARE, CAN TRIMMINGS, COAL HODS, Etc.

Send for Price List.

## Edgar's Patent "Gem" &amp; "U. S." Stove Shovels.

PLAIN SOLID HANDLE,  
Patented Nov. 3, 1874.IMPROVED OVAL HANDLE,  
Patented Jan. 5, 1875.

ENTIRELY ROUND HANDLE, Patented Feb. 22, 1876.

EAST RIVER S. M. MFG. CO., Sole Manufacturers, 206 Water St., N. Y.

## DERBY SILVER CO., Derby, Conn.,

Manufacture the most reliable

## SILVER PLATED SPOONS &amp; FORKS.

They are plated by weight, and not by time or guess, containing 20 per cent. more silver than the usual standard, on a base of Nickel Silver, and finished by hand. Each article is guaranteed by the trade mark and warranted to give full satisfaction. We ask of the trade a fair and impartial test, assuring them that the high standard already attained, shall be maintained. Send for catalogue and Price.



J. M. CARPENTER, Manufacturer of FIRST-CLASS TAPS and DIES, Pawtucket, R. I.

BRASS FOUNDRY & METAL REFINING WORKS.  
B. W. BALDWIN, Manufacturer ofJournal Bearings      **CARBON BRONZE**      Specialty.

Castings for Cars, Mills and Machinery. Also supplied in ingots to the trade. Guaranteed to be the safest and most durable Journal Metal made.      Office, near corner of 25th and H. Sts., Pittsburgh, Pa.

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Office and Warehouse,

No. 216 &amp; 218 N. THIRD ST.

Manufacturers of

## STEEL CASTINGS.

A Substitute for Steel and Wrought Forgings.

23" Circulars sent on application. 23

## Steel Castings

We make Steel Castings true to pattern, sound and strong. Can be worked same as bar steel. Plowshares, Mold-boards and Land-sides, Anthracite Coal-breaker Teeth, Wheels and Pimons, Dies and Hammer Heads, Engine and Machinery Castings of all descriptions, Railroad Frogs and Crossings.

Invaluable for all articles requiring great strength and durability.

Send for Circular.

PITTSBURGH STEEL CASTING CO.,  
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## Crucible Steel Castings

Light and Heavy STEEL CASTINGS of superior quality made on short notice, true to pattern, solid, strong and durable, can be readily forged and tempered.

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Pittsburgh Plow and Crucible Steel Casting Works,  
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54 &amp; 56 Fulton St., N. Y.,

Manufacturer of

TUBULAR LANTERNS,  
"Catch-em-Alive" Mouse Traps,  
BRASS and IRON  
JACK CHAINS.

## SLIGO IRON MILLS

Established 1825.

PHILLIPS, NIMICK &amp; CO.

The only Manufacturers of

"Sligo" Fire Box Iron, Boiler Plate,  
Sheet and Bar Iron,

AND

"Tyron" Brand of Bar, Tank & Sheet  
Iron, Girder and Ship Plates, Angle  
and Horse Shoe Iron, &c., &c.

Plates Rolled 100 inches wide.

OFFICE AND MILLS,

South Side, Pittsburgh, Pa.

Sligo Stay Bolt Iron, Warranted Unexcelled.

BOILER HEADS &amp; FLUE HOLES

FLANGED TO ORDER.

Quality our Specialty.

**UNIFORM SPEED** WARRANTED THE MOST PERFECT GOVERNOR IN THE WORLD. *However great or violent may be the change of load it will warrant any positive uniform speed of engine desired.* ADDRESS: HUNTON GOVERNOR CO., LAWRENCE, MASS.

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**TOLER'S PATENT Improved French Casters**  
The simplest in construction and most reliable ever offered to the public. Can be put on in half the time, and more permanently than the ordinary kinds. Send for Illustrated Catalogue.  
JOHN TOLER, SONS & CO., Newark, N. J.  
Small Gray Iron and Brass Castings.

**SCRANTON Brass Works,**  
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Manufacturer of Brass Work for Water, Gas and Steam. Brass Castings and Jobbing promptly attended.  
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TUBAL-CAIN METAL WORKS  
MANUFACTURERS OF  
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Carriage Bolts made from Best Square Iron, a Specialty.



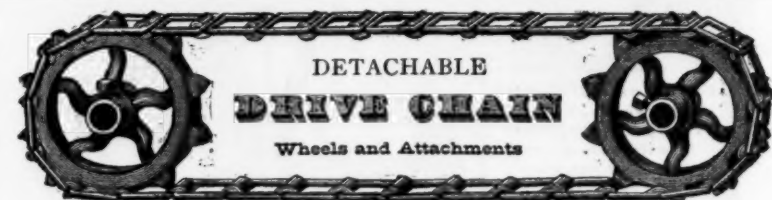
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Positive transmission. NO Friction. Runs Fast or Slow, on all size wheels.  
Stands Exposure. NO Tension. Runs Perpendicularly.  
Noiseless in service. NO Stretching.

For carrying Buckets and Attachments it has no equal.

Is a Profitable Substitute for Belting, Shafting, Gears and Ropes.

Adapted to all kinds of Machinery. Finds various uses in Mills, Mines, &amp;c.

Plans for any purpose furnished on application. 23

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Clean, strong, cheap, weather-proof, and will last a lifetime. In compact coils, about three times the diameter of above cut, and one hundred feet in length; each end carefully soldered.

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Support and lock sashes of all kinds and sizes; are very convenient, simple and durable; are easily and quickly operated, and always sure to hold sashes in most desirable positions. Very suitable for heavy sashes having weights, and for passenger car windows on account of their great convenience. For sale by most Philadelphia wholesale houses. 6 samples mailed for free. Circulars give full instructions.  
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Its superior advantage in power at partial gate is universally acknowledged. Certain chutes at intervals remain fully open, the others close, thereby no efforts are made to destroy the power by creating conflicting currents. Mill owners, Millwrights and those of long experience with Turbines, pronounce Alcott's the most practical, simple and effective wheel in the market. Manufactured and For Sale by  
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